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THE EPISODE OF the Associated Northern Blocks, a London company operating a Western Australian mine, to which we referred in a recent issue in connection with crude notions of directors' responsibilities, has ended in a manner which, from the standpoint of the mining profession, is most satisfactory. Mr. Edward H. Liveing is returning to London to set the facts concerning the condition of the mine before the shareholders; the technical control of the mine management is to be put into the hands of Messrs. Bewick, Moreing & Co., of which firm Mr. H. C. Hoover is an active member, and finally the directorate has been strengthened by the election of Sir Bartle Frere and Mr. J. H. Curle. This professional JOURNAL can well afford to congratulate the shareholders when their affairs are in the hands of such men as these and we hope that the appreciation of the need for experienced directors and managers will spread to the other numerous London companies which go floundering from year to year amid titled incompetence, licensed gambling and unprofessional muddling.

IN THEIR ATTEMPT to ameliorate the condition of the manganese industry and encourage the manufacture of ferro-manganese in Russia for export leading miners in the Caucasus and their capitalist confreres are indirectly planning to cut off one of the most important sources of supply of manganese ore. To attain success in their enterprise it has been suggested that the Russian government allow an export bounty and reduced transport rates on ferro-manganese and a drawback on imported fuel used by the blast furnaces, in order to facilitate competition in foreign markets. It is also intimated that the raw product will then bring better prices. In 1902 the production of manganese ore in the Caucasus amounted to 400,875 long tons, which, excepting 1899 and 1900, was the largest on record. Simultaneously there has been a substantial increase in exports, owing principally to the heavy demand from the United States. In 1902 the exports were 446,412 tons, which although they exceeded the output, were conveniently met by the enormous stocks at the mines and shipping ports. Russia is consuming an increasing quantity of ore, owing to the growth in the manufacture of spiegel and ferro-manganese, but new furnaces must be erected near the mines if the project now on foot is to be managed economically and successfully.

Should the export trade in manganese ore be restricted in Russia some inconvenience will no doubt be felt by the large metallurgical works in other countries. But some consolation may be found in the growing supply of Brazilian ore, although it costs more than the Russian, which in recent years has been sold at a comparatively small margin of profit to the producer. Other sources of supply for America are Cuba, Chile, Spain and India, while European countries can draw from Germany, India and elsewhere.

THE AMENITIES OF LABOR.

A Hungarian, described as "one of the most intelligent and most respected labor leaders in Chicago," was asked whether he thought it right to make outcasts of non-union workingmen, and this is his answer:

"Certainly. Here is the way we look at it: We are at war for workingmen. Now, if this country was at war with another nation and an American should shirk his duty, and go to the enemy, you would call him a traitor, wouldn't you? And he would have to forfeit his life if captured. Non-union men who take the places of striking unionists are guilty of such treason. A strike is a war. And if a 'scab' were brought to me to judge," he added, soberly and quietly, "by G——, I'd hang him!"

Man's inhumanity to man puts on a grotesque air in the face of talk of this kind. It is time that a little of the fresh air of common sense was admitted into the foul atmosphere of the underground chambers where anarchy foregathers. This talk of "war" between citizens of a peaceable country, of "treason" to the edicts of blind leaders of the blind, of "laws" enacted by coteries of embittered demagogues,—all this would be silly, if it were not so serious. The fact is that the rhetorical claptrap of politicians has been given the dignity of technical terms and the careless vaporing of socialists has been accepted literally by the workingmen. When the regulations of voluntary associations are labeled "laws" and are held supreme over State and National constitutions, when the oaths of members of labor organizations are worded so as to set aside all political and religious ties, and when the disorderly actions of mobs are dignified by reference to a state of war, it is high time to order a halt and to call things by their proper names. Secret combinations to subvert law and order are conspiracies, to set aside the law of the land is anarchy and to kill a workman who refuses to affiliate is murder. Mean and cowardly acts are best expressed in plain English.

THE ZINC INDUSTRY IN 1903.

The current year has been characterized from the outset by a very high range of prices for spelter. The monthly average up to August 1 was above 5 cents New York, save in January, and during most of the time has been in excess of 5.5 cents. The strength of the market has been very remarkable and is to be accounted for only by a very large consumptive demand, and the concentration of spelter production to a large extent in a comparatively few strong hands. It is to be observed that at the present time the major part of the production of Western spelter in the United States is made by five concerns—namely, the Matthiessen & Hegeler Co., of La Salle, Ill.; the Illinois Zinc Company, of Peru, Ill.; the Edgar Zinc Company, of St. Louis, Mo., and Cherryvale, Kans., and the Lanyon Zinc Company and Prime Western Spelter Company, both of Iola, Kans. The smelters at La Salle and Peru are largely engaged in the sheet zinc business and take care of the principal part of their product in that manner. The Edgar Zinc Company is a branch of the United States Steel Corporation, which is the largest single consumer of spelter in the United States, its requirements being chiefly for galvanizing purposes. The needs of other consumers must be supplied, therefore, largely by the two big Iola concerns, which naturally work more or less in harmony. This concentration of smelting interests would not, however, have the effect of maintaining a high range of prices were it not for the existence of a remarkable consumptive demand. That there has been, and still is, such a demand is obvious. The smelters have been operating throughout the year at their maximum capacity, while some new concerns have entered the field, but nevertheless they have been unable fully to supply the demand, and stocks of metal have been reduced to the point where it may be said there are practically no stocks, at least not in the hands of the smelters.

In view of this very large demand for spelter, the question of zinc ore supply is an important consideration. The output of the Joplin district has fallen off. During the first 33 weeks of the current year it has amounted to only 155,808 tons, an average of 4,721 tons per week. If this average be maintained during the remainder of the year the total output will be 245,492 tons, which is considerably less than the output in 1902 or the average output of the last four years. The falling off is due partly to the very unfavorable weather in the Spring, but partly, also, to the fact that no really important new discoveries have lately been made, a highly important factor in a district where the life of the individual mines is notoriously short. Since the beginning of 1899 the prices for Joplin zinc ore have averaged high, but nevertheless the production has not materially increased, and it appears as if the maximum productive capacity of the district had been reached at a point between 250,000 and 260,000 tons.

So far in 1903 spelter has been, without doubt, produced at an increased rate as compared with 1902, and if the smelters had been dependent upon the Joplin district to the same extent as formerly, there would have been surely such a shortage in the supply of raw material that the price of metal would have risen very high, probably above the import point,—something which has not happened since the early history of the industry in this country. The Kansas smelters have been, however, drawing large supplies of ore from Colorado, several plants running exclusively on such ore. Moreover, Wisconsin, which has been for many years a small producer of zinc ore, is making an increased output. The Wisconsin ore naturally goes to La Salle and Peru, Ill., and the smelters at these points, by taking some ore that they would otherwise have had to get from Joplin, have tended to relieve the situation. The opinion has been expressed by many who have studied the Wisconsin zinc district that its possibilities are much greater than anything yet developed. It is interesting to note that zinc mining men from other districts, especially the Joplin district, are now giving particular attention to the Wisconsin mines and are likely to become interested therein. In fact, they have already made some ventures. But little confidence in the zinc resources of Arkansas is expressed and certainly it is disappointing that the mines of that State have not made more of a showing since they have had railway shipping facilities and particularly during the present high prices for ore.

THE MONTEZUMA CORPORATION.

Among the reports which are calculated to shame honest mining, few are worse than those given in the prospectus of the Montezuma Gold Mining and Milling Corporation, which owns claims at Barnes City, Colorado. With the neatly printed and well illustrated pamphlet which contains the prospectus there has also been circulated a similar booklet containing the "experts' opinions." In looking over the latter we note the name of an engineer who has gained a good deal of notoriety by attacking a member of his own profession. Mr. Daniel MacLaren may have won a spurious distinction by his criticisms of a distinguished engineer, in connection with an ill-fated and celebrated mine; but such criticisms, without the warrant of a thorough enquiry and provoked apparently by a mere desire for newspaper prominence, are calculated to injure the profession in the eyes of the discerning public and invite the severest condemnation when the author of them is found guilty of writing a report of such a character as the one to which we are referring.

This report is the basis of the Montezuma Gold Mining and Milling Corporation. There is a tunnel called the Spanish tunnel and in it there is "a stratum or dyke of porphyritic rock" and this "carries numerous stringers or seams of oxide of iron, which in itself plainly shows that this dyke is auriferous." No samples or assays are quoted, but Mr. MacLaren says: *"I am told* that samples of rock taken from this tunnel have assayed as high as $60 per ton." There are "eruptive dykes" and "persistent auriferous lodes" and "a flow of lime and gypsum"! The erratic seams found in a series of much altered sediments are likened, in a vague manner, to the bedded deposits of well-known districts, such as Leadville, Victoria and Western Ontario, a medley of unlike regious such as is in keeping with the ill-considered wording of the rest of the report. This padding, plus a few misty data concerning inconclusive workings scattered over the hillsides of a part of Colorado peculiarly distinguished for mineral poverty, is all that Mr. MacLaren gives as evidence in support of his "Concluding Remarks," which are as follows: "I would say that I have visited more than one of the great goldfields of the world, and I am strongly convinced that with further judicious development work on the lines laid down in this report, this property will prove to be one of the large dividend paying mines of Colorado." And there is nothing to indicate that a single sample was taken or that there is any quantity of pay ore of any kind. The only reference to an assay is the one given at second hand. No experienced man would go a day's journey to look at such a sickly prospect, and yet this is to be "one of the biggest dividend paying mines in Colorado"!

How this gentleman can reconcile his responsibility for such foolish stuff with his cheerful public criticism of another engineer, who, whether he erred in a certain estimate or not, certainly does know how to examine a mine properly, we are at a loss to understand. These unprofessional vagaries deserve condemnation.

COAL MINE ACCIDENTS.

The interesting statistics presented in Mr. L. Hoffman's paper on fatal accidents in North American coal mines calls attention to the need of a better enforcement of mine regulations in the various States. Some States have no laws governing the working of mines, at least none that throw safeguards around the life of the miner. Other States have excellent mining codes, but fail to provide means to enforce them. Still other States, of which Pennsylvania is the best example, enact mining codes that theoretically protect the miner from anything except the consequences of his wilful disobedience and then turn over the selection of mine inspectors to an oath-bound secret organization that has never encouraged skill and economy in mining, but has sought to control all matters of mine discipline.

Mr. Hoffman's figures show a decided increase in the percentage of fatal accidents. In this connection it may be noted that, although most fatal accidents are due to falls of rock killing but one or, at most, two men at a time, occasionally a great mine disaster, a flood or an explosion, kills many men. When such an accident occurs in a State employing relatively few miners the percentage of deaths in that State for the year is swelled far above the normal. It is to this cause that the high 1902 figures for Tennessee and British Columbia are due. The steady increase of fatal accidents in all North America since 1898 may be referred to a single cause acting in two ways. Great industrial prosperity has created an unprecedented demand for fuel. The coal output of the United States, which in 1898 was 218,333,883 short tons, in 1902 was 297,000,000 tons, an increase of 34.5 per cent. Such increased production results (1) in ground being opened up rapidly and perhaps in advance of ventilating equipment, and (2) in the employment of great numbers of new men. It is probably to the second of these factors that most of the serious accidents have been due. Though the anthracite mine operators of Pennsylvania have often been taunted with introducing foreign labor, yet the gold mines of the Rocky Mountains, the iron mines of Minnesota and the coal mines of British Columbia can all show a high percentage of foreign born employees, many of whom have had no previous mining experience and some of whom do not understand English. Prosperity and resulting high wages have attracted these men, employers have been glad to make use of them and trade unions have found among them, as recent occurrences in Colorado show, agents for any act of deviltry. Professional agitators and politicians after the labor vote sow the seeds of unrest; impaired discipline at mines is part of the harvest.

Mr. Hoffman truly says that the matter of coal mining fatalities requires more attention than it has received. Yet efficient regulation of mine operations in the present political condition of some States is going to be extremely difficult. Attempts at improvements will have to meet the selfishness of those mining corporations that neglect the safety of employees in seeking large immediate profits and also the selfishness of trades-unions trying to control mine discipline. In addition the steady influx of immigrants seeking the high wages offered by employers, yet frequently becoming the most troublesome element in trades-unions, increases the difficulty of reform.

MINING DIVIDENDS.

The mineral industry of this country, notwithstanding labor troubles and a fluctuating market for the various products, is yielding substantial dividends to investors. In August, stockholders in 36 public corporations received dividends amounting to $13,225,353, and since January 149 concerns have reported a total of $99,751,258. The distribution of these enormous dividends is shown in the table below:

	August.	Eight months.
Copper	$1,795,994	$10,335,677
Gold, silver, lead	826,618	10,420,592
Nickel	.....	349,660
Quicksilver	.....	81,500
Zinc	300,000	952,716
Total metal	$2,922,612	$22,140,145
Iron and steel	$9,889,294	42,565,012
Coal and coke	134,960	3,639,126
Oil and gas	259,487	28,005,782
Chemicals, etc	19,000	3,401,193
Total, industrial	$10,302,741	$77,611,113
Grand total	$13,225,353	$99,751,258

In considering this statement it should be remembered that the large payments made by industrial companies have been due chiefly to the heavy capitalization of the United States Steel Corporation, which reported dividends of $36,955,807, being at the annual rate of 7 per cent. on the preferred stock and 4 per cent. on the common. The Standard Oil Company also contributed $26,190,000, which is equivalent to 27 per cent. for two quarters. Thus it will be seen that these two large combinations have furnished over 81 per cent. of the total dividends announced by industrial companies in the first eight months of this year.

It is also interesting to note that the public copper companies, though numbering considerably less than gold, silver and lead properties, have paid nearly as much in dividends. Three new copper companies having a par value of stock of $25 per share, have been added to the list this year: Tennessee, paying a semi-annual dividend of 5 per cent. in July; Trimountain, of Michigan, 12 per cent. for March and June, and Champion, also in Michigan, 4 per cent. in May. With the exception of Amalgamated, which earns its dividends from holdings in subsidiary companies, all the copper properties have yielded a good percentage on their capitalization. The gold, silver, and lead companies paying dividends are steadily increasing, and by economical management and intelligent treatment of low-grade ores the revenues have grown so that a number of mines have been able to declare extra dividends this year. The two largest payers in this group are the Utah mines, Daly-West and Silver King, which declare 36 and 40 per cent. respectively per annum on a par value of $20.

Of the gold mines that have increased their dividend rate, Camp Bird, of Colorado, which is largely held abroad, is a noteworthy example. In March and May quarterly dividends at the rate of 12½ per cent. per annum were paid, and in July a bonus of 7½ per cent. was declared, making a total of 20 per cent. for the fiscal year. A quarterly dividend was paid for September 1 at the rate of 15 per cent. per annum. Another Colorado gold property controlled in Great Britain is Stratton's Independence, which paid a 5 per cent. dividend in August, the first in over a year and a half. In addition to those named there have been numerous small monthly dividend payers, especially in Colorado.

The nickel dividend was paid by a metallurgical company purchasing ore and matte from Canada and elsewhere. California was the source of the quicksilver dividends, while the zinc has been paid chiefly by the New Jersey Zinc Company, which distributes 12 per cent. per annum.

Indications point to increased dividends during the closing months of this year, and the likelihood is that there will be a substantial improvement in various branches of the mineral industry in this country.

As regards the profits in the mining and metallurgical industries of Mexico, it may be said that in August nine properties reported dividends of $97,764 gold, and in the eight months of this year 25 companies paid a total of $1,683,799, mostly in monthly instalments.

MARKET CONDITIONS.

Sept. 2.

The silver market has suddenly recovered from its late lethargic position, and prices exhibit an advancing tendency. It has been a very long time since silver approached 60c. per ounce in New York, and for months it was below 50c. At the opening of January this year 48⅜c. was quoted, which compares with the high mark of 57⅞c. on Monday, August 31. Thus in eight months the price has risen 9½c., and what is more surprising, the advance has been made chiefly in recent months, August alone showing a recovery of 3⅛c. The London market was similarly affected. The recent improvement in prices is attributed principally to the heavier purchases of silver for Indian account, and to a certain degree to the increased shipments from London to the Straits Settlements and China. The outlook, as far as it is practicable to predict, is for steadier market prices than have ruled for some time.

Copper is rather quiet, as business is of small volume only. The statistical position, however, is healthy, in so far as there are no accumulations of stocks, owing to the good consumption.

Tin shows a considerable decline this week both here and in Europe, as trade is inactive. It is noteworthy that the price of tin has dropped in the face of an advance in silver, it being customary to see both metals move in the same direction. One explanation of the decline in the value of tin is the closing down of the tinplate works in South Wales, owing to labor troubles. Another reason given is the large shipments of tin in August. Cable despatches from the East Indies intimate that shipments in September will likely show a falling off.

Lead continues firm, though uninteresting from a market viewpoint, as prices remain unchanged.

Spelter is very active. The season is approaching when the large galvanizers become busy, and some of them are booking ahead on their requirements. Owing to the scarcity the position of spelter is strong and may continue so for some time.

In the iron and steel trades the conditions have not changed materially during the week, and the deadlock between buyers and sellers in many lines of material is still unbroken. Pig iron shows no improvement, and in fact it is stated that Southern irons are being sold considerably below the recent official quotation, while Northern bessemer, and forge irons are weaker. Although about twelve furnaces are out of blast in the Pittsburg district, a project to bank all furnaces in the district for thirty days has been discussed, but is not likely to be adopted. In finished iron and steel there is no particular change, though prices generally are as firmly held as last week. Consumers still delay purchasing, apparently not caring to tie themselves to long-term contracts. The ore movement down the Lakes has fallen off, and some mines will not ship much more this season. There has been no change in the regular quotations for ore at Cleveland, but it is said that sales are being made at less than quotations.

The coal trade of the country is generally quiet. Docks at the head of the lakes are still congested with bituminous coal, and the movement by rail suffers from short car supply. In Chicago territory there has been no improvement in the demand for bituminous, and trade is dull. Along the lower lakes buying is improving, as the manufacturing plants that have been idle resume work, and the outlook for steam coal is fairly good. From the Pittsburg district come rumors of the Pennsylvania Railroad purchasing the fee of the lands controlled by the Pittsburg Coal Company. In the coke trade prices are lower. In the Atlantic seaboard bituminous trade the market remains quiet, with demand light, and car supply sufficient to the needs of the market. Prices continue low, and little improvement is looked for immediately.

In the anthracite trade sales have fallen off, and the outlook is for a quiet September. Most yards in the East now have their wants supplied, except some at points beyond Cape Cod. A heavy tonnage is going forward by lake to upper lake ports. It is stated that the Philadelphia & Reading Company has shut down its washeries owing to the accumulation of steam sizes.

METALLICS.

Selenium occurs in coke. Mr. J. F. Smith found from traces to 0.015 per cent in coke from several parts of Yorkshire, England.

Rocks enclosing quicksilver deposits are of very diverse ages, ranging all the way from Archean granites and schists to recent strata and lavas.

Iron ores, especially magnetite, are widely distributed throughout the igneous rocks, but it is only among the more basic members that they have been segregated so as to form bodies of economic importance.

At Nikitowka, in Southern Russia, cinnabar occurs impregnating sandstone of Carboniferous age, having a thickness of 46 ft. The average grade is stated to be 0.6 per cent. These deposits rank next in importance to those of Almaden and Idria in Europe.

It has been estimated that for making steam natural gas at 10c. per 1,000 ft. is as cheap as coal at $1.25 per ton, even though the coal be fed under the boiler by the best types of automatic stokers. For domestic purposes natural gas at 25c. per 1,000 ft. is considered as valuable as anthracite coal at $5.50 per ton.

There are many subjects in inorganic geology that are as much a mystery to the scientists of today as they were to the first workers in the field. Yet with all the difficulties in the way of investigation, the collection of evidence has gone on apace and some day a new Darwin may appear to analyze and interpret it.

The mineral and metal wealth of the United States is enormous, being valued at $1,231,072,789 in 1902. Yet there are many important substances, such as potassium salts, nitrate of soda, and tin ore which, though deposits have been found here, are not being produced in commercial quantities. On the other hand, greater care is being taken to save and utilize the by-products in manufacturing.

Copper silicide with 10 to 35 per cent silicon is made in ingots weighing from 15 to 18 lb. in the United States, and is used for the final refining of copper instead of the copper phosphorus compound; for strengthening the ordinary telephone wires of electrolytic copper; for tinting zinc bronzes instead of copper phosphide, and for making alloys by addition to aluminum bronze, whose tensile strength and hardness range from that of ordinary brass to the hardest phosphor bronze.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

FEDERATION OF TECHNICAL SOCIETIES IN ENGLAND.

The Editor:

Sir.—The letter from Mr. M. Walton Brown, published in your issue of August 1, is admirably calculated to mislead those of your readers who may know nothing of the relative importance and standing of the Institution of Mining and Metallurgy, founded in 1892, and of the Institution of Mining Engineers, which, founded in 1889 under the title of the Federated Institution of Mining Engineers changed its name in 1898 to that which it now bears.

As an ordinary member of the Institution of Mining and Metallurgy, I feel bound to make some remarks on this long-cherished dream of Mr. Walton Brown to absorb the Institution of Mining and Metallurgy in his heterogeneous Federation. The aims of the two societies referred to and their respective classes of membership are so different that such an absorption, improbable as it was a few years ago, may now be regarded as absolutely outside the realm of practical politics. It is not in the least likely that an institution which includes on its council and in its ranks the principal members of the profession, who are responsible for the direction of the great mining enterprises of the world whose financial center is in London, would ever consent to become a "Federated" or branch institution, ranking equally with provincial societies, as for example the Midland Institute of Mining, Civil and Mechanical Engineers, or the South Staffordshire and East Worcestershire Institute of Mining Engineers, with their membership of from 200 to 300 each. The Institution of Mining and Metallurgy investigates the qualifications of those it admits to membership, and "turns down" quite a proportion of the applications received. The Institution of Mining Engineers not only admits to membership without further inquiry all persons holding certain positions whose application is signed by a couple of members of one of the federated local societies, such as colliery proprietors, agents, bankers and solicitors, but sends out circulars at intervals inviting people to join its ranks. Thus the writer has, on two different occasions, received circulars signed by Mr. Walton Brown as secretary, drawing his attention to the advantages of membership in the Institution of Mining Engineers and requesting him to take the necessary steps to join. This sort of thing is regarded by a good many members of the profession as quite beneath the dignity of a technical society, if not positively discreditable, and it is on this account that not a few erstwhile members of the Federated Institution have severed their connection with that society and joined the Institution of Mining and Metallurgy instead.

I enclose my card as evidence of good faith.

OLD SUBSCRIBER.

London, England, August 14, 1903.

MATTE SMELTING AND MAGMATIC SEGREGATION OF ORES.

The Editor:

Sir.—Of the various suggestions and theories relating to the origin of ore deposits brought into greater prominence by the papers read before the American Institute of Mining Engineers, and the discussions thereon, during the last three years, I think none has excited more interest and criticism than that of the possible origin of many ores by magmatic segregation. I have been expecting to see some reference made to the artificial production of certain mineral species in smelting furnaces, as evidence bearing on this theory, but so far no one taking part in the discussion appears to have done so.

The formation of various minerals in roast-heaps and in the wall accretions of blast furnaces by sublimation is well known, and has been often recorded. I wish to record certain experiences of my own in the reverberatory smelting of mixed ores which are interesting and may have some bearing on the subject of magmatic segregation.

In the earlier days of copper smelting in Australia reverberatory furnaces fired by wood were universally employed. The upper parts of most lodes which are at all copper-bearing below carried enough rich oxidized copper ore to make the erection of a furnace very tempting. As a rule, the rich ore was of small extent, the lodes lower down became a mixture of sulphides of iron, zinc and lead, too poor to pay, and the furnaces were shut down and abandoned after a few montths', or in many cases even weeks' work. Firebricks were imported at great cost from England, the cost of land transport was enormous, so attempts were made generally to utilize local refractory material—with curious results. Dry Australian hardwood produces an intense heat, and in one case I know of, the whole inside lining and the roof melted and fell into the charge. But the attempts to form the sand bottom of the old style furnace were generally the most disastrous, nearly always ending in failure, the smelting eventually being conducted on a slag bottom; that is to say, slag was melted evenly up to what was the right height for the bottom, allowed to set and cool off, and the smelting afterward conducted on that.

First matte-smelting can be carried on satisfactorily on such a bottom by experienced smelters; but with green hands and with basic charges it often happens that the furnace becomes filled with a fused or semi-fused mass of matte, slag, ore and bricks. When this is cooled down and another coating of slag smelted on to form a new smelting surface there is a depth of 18 in. to 2 ft. of heterogeneous material—masses of bricks and ore stuck together with slag—masses of slag alone, and many cavities (some quite large) filled with liquid matte. This mass will be subject to a continuous high temperature for months at a time, during which the matte in the cavities must remain liquid.

Here, surely, there is some similarity to the conditions supposed to be necessary for magmatic segregation, the pressure, of course, being absent.

When such a furnace is pulled down the bottom is a highly interesting object. It has been my lot to pull down several of such furnaces and to examine the ruins of many others.

Among the mixture described above I have found substances which, if I were to meet them elsewhere than in the bottom of a reverberatory furnace, I should call native silver, chalcopyrite, galena and blende.

The following I remember particularly: No. 1 furnace had been in use about a year, smelting heap-roasted ore and battery tailings. The ore was a fine-grained mixture of sulphides, containing about 3 per cent copper, 6 per cent lead, 15 per cent zinc and 6 per cent silica. The matte usually made carried about 30 per cent copper, 200 oz. silver per ton and 11 per cent lead. The bottom had been built of brick, on three arches supported on iron girders; this collapsed at an early stage, the girders being eaten through. When removed there were several tons of matte among the medley of brickword and iron. In places there were masses of a yellow material containing 33 per cent of copper, which had all the characteristics of copper pyrite.

Furnace No. 2 had been built without any culvert on the ground. When newly erected the material was so bad that practically the whole inside melted into one mass. It was first used for smelting a mixture of copper carbonates and sulphides, of very pure quality; subsequently a mixture of gossans and sulphides from a lode which in depth became mostly zinc-lead sulphides. The matte made varied from 20 to 40 per cent copper, and latterly carried 300 oz. silver per ton and a good deal of lead. When pulled down the matte was found irregularly distributed through the mass and had penetrated deeply into the soil among the old rootlets. It was highly crystalline and resembled galena; its value was only one-half the value of the average matte which had been made during the life of the furnace.

No. 3 was a well-built furnace. It had smelted about 10,000 tons of ore consisting of four-fifths gossan and one-fifth sulphide, from a lode which averaged 30 per cent silica, 12 per cent lead, 14 per cent zinc and 2.5 per cent copper. The lowest matte made in this furnace during its lifetime assayed 25 per cent copper and 375 oz. silver, while most of it was much higher. When dismantled it was found that between two rings of brickwork there were over five tons of a clean material which resembled galena. This substance assayed in bulk 66 per cent lead, 5 per cent copper and only 120 oz. silver per ton.

No. 4 furnace was built with a brick bottom. The bricks were of such poor quality that bottom and sides melted within two months of starting; subsequent operations were conducted on the ruin. At times there was a fairly even bottom high in the furnace; at others the bottom was as irregular as a coral reef, while sometimes it would appear to melt up *en masse*. About 12,000 tons of heap roasted sulphides were smelted in this furnace to a matte averaging 30 per cent copper, 40 per cent lead, and carrying from 400 to 1,000 oz. silver per ton. The roasted ore averaged 20 per cent silica, 12 per cent lead, 24 per cent zinc and 1 per cent copper. The matte was tapped by drilling a hole at different places round the sides of the furnace, wherever there seemed the largest accumulation for the time being. Some limestone was used to lighten the slag, which was very basic, the silica occasionally falling below 20 per cent.

When the bottom of this furnace was cut out it weighed 40 tons, and was a crystalline mass of matte and slag; but not a uniform mixture. In places there was nothing but slag, and others nothing but matte, and the matte was sometimes like galena, and sometimes like massive blende. That like galena assayed 47 per cent lead and carried 211 oz. silver per ton; the "blende" (which was not a yard away from the "galena") assayed 42 per cent zinc and only 4.5 per cent lead, with 6 per cent copper and 170 oz. silver per ton. The last ten tons of matte tapped from this furnace before shutting down assayed: Copper, 32 per cent; lead, 32 per cent; silver, 946 oz. per ton.

The "slag" was very interesting, being an entirely crystalline mass of greenish-gray color, very much like certain basic intrusives not far from and in the same geological horizon as the mine from which the ore came. It frequently showed, where broken, faces of "blende" crystals, and long thin vugs lined with similar crystals. It is a curious coincidence that at the time this bottom was being removed the lode at the mine from which the ore had come was passing through a gray rock containing similar fractures and thin vugs lined with blende. The natural rock was not so crystalline as the "slag," but otherwise resembled it in a remarkable manner.

In each of furnaces Nos. 2, 3 and 4 metallic silver was found plentifully spangled among the common brickwork (not among the firebrick) in the neighborhood of the matte. In the mine close at hand native silver is found, never in the lode, but always in the slates bordering close to the ore.

I feel sure that had these furnace productions been exhibited at the recently reported meeting of the Geological Society of Washington labeled "Chalcopyrite," "Galena," "Blende," etc., few of the distinguished geologists present would have questioned their natural origin.

It seems to me evident that minerals may be formed by aqueous agencies or by igneous agencies, and possess in either case exactly the same characteristics. The particular agent for particular lodes must be determined by other considerations than the nature of the mineral contents. The theory of magmatic segregation appears to me to supply, in many cases, a long-felt want.

EDGAR HALL.

Silver Spur, Stanthorpe, Queensland, July 16, 1903.

THE MESABI IRON RANGE.

The Editor:

Sir.—May I ask your indulgence for some remarks that border on personal matters? Under cover of anonymousness and in a presumably truthful and unbiased review of Dr. Leith's recent monograph of the Mesabi iron bearing district of Minnesota, are found certain statements which call for some attention. These statements, thus dignified by publication in your columns, are in the nature of an attack upon the work of my father, N. H. Winchell and myself on the iron ranges of Minnesota, and an attempt to show that the work was utterly worthless, and the conclusions reached entirely erroneous. The paragraphs to which I particularly refer are the following, contained on pages 168 and 169 of the JOURNAL for August 1, 1903:

1. "As is well known, it was the scantiness of the data, a few exposures of lean ore, that caused the Mesabi to be passed on unfavorably by capable geologists, when the Vermillion Range came into prominence." . . . . .

2. "There is no need of criticising here the work of the Minnesota geologists, who, after years of study, failed to detect the stratigraphical relations that were seen by others after a few months' study; nor of calling attention to the utterly fantastic hypotheses they proposed for the origin of the Mesabi and Vermillion iron ores. Dr. Leith gives them credit for what they determined." . . .

3. "He divides the rocks found after the general scheme of pre-Cambrian classification adopted by the United States Geological Survey, discarding the vagaries of Canadian and Minnesota geologists." . . .

4. "He points out that the rock is undoubtedly a sedimentary formation. The iron probably present as carbonate in the Upper Huronian ocean was precipitated as ferric hydrate, but, deeply buried with vegetable matter, it was reduced to the ferrous state and then combined with silica to form ferrous silicate." . . . .

5. "He believes that the ore bodies are essentially of surface origin formed by the action of meteoric water."

Taking up now seriatim the statements quoted above I have to say:

1. It is probable the "capable geologists" referred to as having "passed unfavorably" on the Mesabi range were those of the Minnesota Survey. In reply to this absolutely unjust and untrue assertion I challenge your anonymous reviewer to point to one single line in *all* the reports of the Minnesota Survey where the Mesabi is "passed on unfavorably." Prof. A. H. Chester made an examination of the region in 1875 and reported very conservatively on the Mesabi, but so far as his report published in 1883[1] goes, not adversely, although he saw only a portion of the range, and that portion has not yet proved productive. His report was very favorable on the Vermillion range, and plainly noted the correlation between the Penokee-Gogebic and the Mesabi, which has been repeatedly confirmed in the later Minnesota reports, and for which credit is given by your anonymous reviewer to Dr. Leith. Prof. Chester speaks of this point in the following language: "In all respects except this horizontal bedding the Mesabi district is precisely similar to the Penokee region of Wisconsin, and a person familiar with the latter cannot fail to notice the close resemblance. Here are the same magnetitic schists, hornblendic magnetitic schists, dark and light gray quartz schists, arenaceous gray and white quartzites and other similar rocks, and especially here is the same apparent substitution of quartzite and magnetite for each other. The writer pointed out this resemblance in his report on the Mesabi district, presented in 1875, and is now clearly of the opinion that the iron-bearing rocks of this district bear the same relation to the Huronian series as do the rocks of the Penokee iron range in Wisconsin."

His conclusion is: "The geological similarity of the Vermilion iron deposits to those of Marquette is the impressive fact to be noticed by the people of Minnesota and it is safe to predict the development there of an iron district of immense value and importance."

But not only did the early Minnesota reports not "pass unfavorably" on the Mesabi; on the contrary they were singularly opposed to the general opinion of iron men in their favorable expressions of opinion toward it. Thus the report for 1885 gives a section (p. 22) showing correctly the stratigraphy of the Mesabi range, and on page 23 it is stated that it is in a separate horizon near the bottom of the Animikee slates and quartzites and probably parallel with the Commonwealth mines in Wisconsin.

Bulletin No. VI.[2] on the "Iron Ores of Minnesota," written in 1889 and 1890, and published early in 1891, contains the following statement:

"That the Taconic (name here used to designate the Mesabi and Gogebic iron formations) in Minnesota was an age of animal life in the ocean is indicated not only by the carbonaceous character of the black slates, and by the recent discovery of traces of fossils in the Thunder Bay region, but also by the presence of considerable beds of the carbonates of lime, magnesia and iron. These have been long known. They were described briefly by Logan and by Bell. That they are a portion of the original rock strata, and that their origin dates from the origination of the Taconic as a formation, it seems to us can hardly be questioned. They appear to be due to the chemical precipitation of the salts of lime, magnesia, and iron in the presence of an excess of carbonic acid. The curious mixture of lumps and somewhat angular pieces of chert, jasper and jaspilyte in these beds, when the beds themselves are not purely sedimentary products, may be referred to the same causes as operated in the breaking up of silicious strata in Keewatin time, and their quick transportation to new places and burial under freshly accumulated deposits of the ocean, whether of ordinary sedimentation, chemical precipitation or volcanic eruption.

"We are quite ready at this time to adopt the theory that has been referred to, originating with Dr. Edward Hitchcock and more recently adopted by Prof. J. D. Dana and Prof. R. D. Irving, that these carbonated beds may be changed, and have been, on a large scale, in the Taconic rocks of New England and of the Penokee-Gogebic range, by infiltrating waters, that their alkaline constituent has been carried away and their iron has been redeposited or concentrated in a residual condition as ferric oxides, and that by this concentration large beds of iron ore have been formed. It is because of this that we state our belief that *possibly important beds of limonite or hematite, originating in this way may yet be found in the Taconic region of Minnesota,* the parallel of those that have recently been opened up in northern Wisconsin. . . . .

"There is no question in our minds as to the correctness of the parallelization which Prof. A. H. Chester adopted. He called attention pointedly to the similarity of the rocks and general geology of the Mesabi and the Penokee ranges. . . . .

"This opinion has been borne out fully by subsequent examinations almost without exception. But *there has not yet been found* in the Taconic rocks of the north side of Lake Superior any iron deposits that are parallel in quality and abundance of those on the south side." (pp. 145-147.)

Again, on p. 112: "The Mesabi Range. Although there is at present no mining in these ores in Minnesota, they are well known at numerous places. . . . . They are destined to play a very important part in the future development of the iron industry of the State. They occupy four-fold the area that is occupied by the Keewatin ores (Vermilion range), and they are nearer the ore-shipping points as well as the iron-using markets. It is on account of this high promise of future productiveness that they are fully described in this bulletin."

One more quotation on this point taken from this same report, published before the shipment of a ton of ore from the Mesabi, and received with ridicule by the iron ore men:

"It will be seen by this and by the accompanying geological map, that Minnesota possesses not only a greater variety of iron ores thus far known than either of the great iron-producing States on the south side of the great lake, but also a greater territory in which iron ores may be expected to be found in merchantable quantity and quality. In the body of this report it was intimated that the Mesabi range is the northern rim and parallel of the Penokee-Gogebic range on the south side of the lake, and that it might in the future exhibit a great development comparable with that of the south side of the lake. Even before this report closes comes the first verification of this prediction. *There can be no reasonable doubt that in Minnesota about the western and northwestern confines of the Lake Superior basin and extending westward to the Mississippi River there will yet be mined in the Mesabi range even greater quantities of hematite than have been taken from that marvel of mining districts, the Penokee-Gogebic range.*" (loc. cit. p. 160.)

2 and 3.—It will be admitted on all hands that there is much difference of opinion as to the geology of the Vermilion range. The reports of the United States Geological Survey have adopted many of the views of the Minnesota geologists which were at first utterly rejected, and more of these views may be adopted in the future. Too much space would be required to enter into a comparison and discussion now. I will, however, refer briefly to the "vagaries" of structure on the Mesabi range, and the "utterly fantastic hypotheses" of the origin of the ores:

Structure.—In a report published in 1892[3] and in a paper presented to the American Institute of Mining Engineers in October, 1892, I gave the structure of the "Mesabi" as follows, in descending order:

1. Gabbro unconformable on all the following.....Taconic
2. Black slates—Animikie..... "
3. Greenish silicious slates and cherts..... "
4. Iron ore and taconyte horizon..... "
5. Quartzite unconformable on 6 and 7..... "
6. Green schists of the Keewatin.....Archean
7. Granite or syenite of the Giant's range..... "

Dr. Leith's theories of classification and structure, modified to suit the latest revised version of the United States Geological Survey, shows the Archean basement complex at the bottom, the Huronian next above it, corresponding to my granite at the bottom and Keewatin, both of which I consider Archean. He then has the same succession of quartzite uncomformable on the Huronian or Keewatin, and the iron-bearing horizon followed by a slate, the whole capped by gabbro. He discovered some dikes of basalt and granite that were not noticed by me, and he introduces some minor refinements of structure revealed by the development work so extensively prosecuted in the decade that elapsed between the publication of the two reports. But in no important particular do his conclusions differ from the "vagaries" of my report of 1892.

4 and 5.—Now as to theories of origin: Some of the quotations already made from "The Iron Ores of Minnesota" contain an outline of our theory of the origin of these ores. In a paper by my father and myself, published in the *American Geologist* for November, 1889, "On a possible chemical origin" of iron ores, we advocated the theory of chemical oceanic precipitation in the form of ferric oxide, or hydrate, and in all of my subsequent writings I have held to this idea for the original ore formation of both the Vermilion and Mesabi ranges, admitting also the presence of carbonates and the later modification of the original rocks by the ac-

[1] Eleventh Annual Report Minnesota Geological Survey, pp. 155-167.

[2] "The Iron Ores of Minnesota," by N. H. Winchell and H. V. Winchell, Minnesota Geological National History Society, p. 430, 1891.

[3] The Mesabi Iron Range, H. V. Winchell, Minnesota Survey, 20th Annual Report, 1893, pp. 111-180; A. I. M. E. Vol. XXI., 1893, pp. 644-686.

tion of meteoric waters. "As for the source of the iron, it is believed to have been largely the result of oceanic deposition, both chemical and mechanical, and to have been simply concentrated in its present situations." (H. V. Winchell, loc. cit. p. 146.)

But Leith says the same thing. Hence our notions appear "fantastic" by reason of their very antiquity.

It is a remarkable fact that in no important particular has Dr. Leith in this report of 1903 modified or contradicted the general outline of geological structure and genesis of the ore given in my modest report of 1892. Indeed, it is seldom that elaborate investigations made after full development of a vast mining district agree so uniformly and substantiate so completely the preliminary views resulting from hasty examination of very incomplete data. It will leave it to the impartial reader and critic of the future to decide how fully credit is given in the later report for priority of fact and theory in the earlier one.

It is but natural when one performs a task in such a way as to stand the test of time that he should desire credit for it.

HORACE V. WINCHELL.

Butte, Mont., August 20, 1903.

(We publish Mr. Winchell's interesting letter with pleasure, but he is in error in calling the review anonymous. It was prepared by a member of our staff, as all our consigned reviews are.—EDITOR.)

VOLATILIZATION OF METALLIC CHLORIDES.

The Editor:

Sir.—Mr. Stuart Croasdale in your issue of August 29, presents very clearly the technical side of sublimation of metallic chlorides, but without dissenting from the conclusion that such a process can be made practicable, I desire to draw attention to certain portions of the process that would appear worthy of further notice, which have either escaped Mr. Croasdale's attention or have been but lightly touched on in his very able summary of this method of metal recovery from ores.

Comparison of this technical process, as a series of steps, with the familiar coal-gas distillation process has been of service to the writer in arriving at a comprehension of its underlying principles, for though sublimation of metallic chlorides involves the reduction of all gases formed to their several elements, and the manufacture of coal-gas precludes the destruction of the larger portion of the gases, the methods used to produce and conserve these gases certainly partake of like technical principles, even if they do not precisely agree in identical application.

Paralleling the two plants in columns, we have:

Coal-gas plant	Pohlé-Croasdale Plant.
Coal-gas retorts	Chloridizing furnace.
Tar-scrubbers	Expanding chamber
Air condensers }	Cooling flue
Water condensers }	Gas exhauster
.....	Condensing tower
Ammonia scrubbers	Precipitation or electro-
Purifying boxes	lytic tanks
Gas exhauster	.....

The gases resulting from furnacing chlorides of the metals are complex in the extreme; gold chloride notably forms and volatilizes to a large extent as aurous chloride, AuCl, either with or without the assistance of base or alkaline chlorides in mass. At the first opportunity beyond the range of the furnace temperature the following reaction begins: $3AuCl = 2Au + AuCl_3$, which accounts for the gold deposition in the flues, as also for the fact that some occurs in the saturating tower. In the event of copper being present in the ore an additional chloride may be found. This double chloride is $AuCuCl_3$, which may be expressed:

$$\begin{matrix} & / \ Cl \ \backslash & \\ Cu & & Au\text{-}Cl \\ & \backslash \ Cl \ / & \end{matrix}$$

It does not dissociate until water is encountered, and not even then entirely until the solution becomes saturated.

In addition to the chlorides occurring gaseous in the Pohlé-Croasdale operation, which may be called simple chlorides, by way of differentiation, there are capable of formation by kindred methods entire series of other gaseous metal chlorides which may be termed compound. As further definition one may assume the simple chlorides as high temperature reactions, while the compound chlorides are of low temperature formation. In some instances these begin to form at 180° F., and in all instances under observation dissociate at or below 500° C., partially into metal and partially into simple chlorides, although with proper precautions following the Pohlé-Croasdale method as well, one may have only chlorine gas and metal at their dissociation temperatures.

The formulas and characteristics of these compound chlorides are only noted here in passing because their formation at low temperatures accounts, in a measure, for the volatilization losses of gold in certain fire-assays. Some ores possess naturally the elements uniting to cause gold sublimation; in others the fluxing charge of the assays contribute to or wholly causes the formation of these gaseous chlorides. It is for this reason that variable results are returned by some telluro-selenide ores, with the Kansas shales, with the Grand Cañon platinum sands, and finally with tailings from a chloridizing operation. Precautions taken knowledgeably in the fire-assay will prevent this gold loss, otherwise the securing of comparable returns is accidental unless the same charge be used for checks.

The presence of the double chloride of copper and gold together with other more complex chlorides occurring in chloride sublimates, supports my contention that these gases may be regarded as solutions, just as one may have several chlorides soluble in each other, to the same degree that alloys are solutions. So long as these fumes are gaseous-molten, so to speak, they are in their state of greatest permanency; as soon as the gases are expanded and cooled certain portions of them shrink out—crystallize and deposit, phenomena comparable to those noted in the cooling of alloys.

That the temperature necessary for the complete sublimation of metallic chlorides from ores by the salt roast is in reality much less than is generally appreciated is because of the action of the mass of the gaseous chlorides (mass action) both on themselves and on those chlorides less volatile.

There are many instances in chemistry of reversible reactions according to changes in the mass or proportion of the elements or compounds present in the reaction. These actions of mass are true for solutions, for molten solids (alloys) and they are certainly equally true for gaseous chlorides.

One readily appreciates in compounding alloys that the addition of each successive element tends to depress the melting point of the entire alloyed mass. Thus with gaseous chlorides each additional element present tends to depress the sublimative temperature of the entire gaseous mass, and however high the temperature which might be requisite for the sublimation of one metallic chloride, it would not necessarily be so high for a mass composed of several different chlorides.

In addition to the aid of the compulsion of mass in the furnace we must take account of the pressure of solution of certain insoluble gaseous chlorides into the chlorides capable of dissolving them.

From the foregoing it will be obvious that any calculation of the amount of heat necessary to be supplied to sublime all of the metals in an ore as chlorides must take into account (1) the mass of each chloride present and its proportion to the whole, (2) the number of kinds of chlorides present, (3) the aid, however slight, of a pressure of gaseous solution of the less permanent and volatile chlorides into those more stable and volatile; (4) the aid of the suction fan in diminishing the pressure of atmospheric resistance to chloride sublimations.

The sublimative temperature of base metal chlorides is depressed along the lines of a gaseous alloyed mass of chlorides, hence the greater the numbers of kinds of these chlorides present the lower the temperature required to sublimate them. As a matter of fact, complete sublimation of the metals in an ore may almost always be accomplished at 900° C., and with favorable working conditions at 650° to 700° C., paralleling the Pohlé-Croasdale procedure. If some sublimation methods are utilized the temperature may be lowered still further. The writer has accomplished the sublimation, as compound chlorides, of all the values in a copper-gold-silver ore at a temperature lower than 400° C., and under certain conditions not yet fully explicable, a partial sublimation of some metal chlorides at a temperature lower than the boiling point of water 212° F.

Though difficulties of furnacing are clearly indicated by the frequent and radical exchange of types of furnace, it is somewhat curious that all expressed technical criticism of, or objection to, the Pohlé-Croasdale process should tacitly admit the practicability of complete volatilization while emphasizing the impossibility of separately (or indeed at all economically) recovering the metals from their gaseous chlorides. The writer's conclusion, from a series of careful experiments, is that the furnacing is the crux of the Pohlé-Croasdale operation. Chloridization and sublimation are rarely simultaneous operations and when they are accomplished simultaneously there is grave danger of loss of salt by sublimation, thus discharging tailings containing values at the end of the furnacing. This loss of salt, or the equally serious loss of sulphurous acid noted by Mr. Croasdale as beneficial to the resultant chloride solutions, occurs at a vital point in the furnace process.

With the type of furnace now in use no additions to the charge may be made in process, and if volatilization other than the chlorides occurs it may well be accomplished at the expense of chloridization; further, the use of a White-Howell furnace for this process implies that the charges entering the furnace must be highly heated, thus entailing additional operation, else the heated gases from the finishing end of the furnace will deposit on the cold ore entering the unit. Also the air needed at the chloridizing end of the unit must be entered at the discharge end of the furnace where its presence entails oxidation of the chloride gases, some of which are oxidizable. When oxy-chlorides are formed from gaseous chlorides the tendency is toward their crystallization at the first lowering of temperature, which may well occur with this type of furnace within the unit rather than in the gas recovery process, where it might be advantageous.

My opinion that the furnacing is the critical point of the entire operation is not based wholly on the danger of losses from incomplete chloridization or sublimation, but for the reason, equally vital, that the furnace manipulation and procedure pre-determines the character and quality of the gases. Thus, with some methods of furnacing all the metals can be separately crystallized or thrown out of their gaseous solution without the aid of water. With others this procedure is impossible fractionally. The crux of the Pohlé-Croasdale gas-handling process is the shelved tower where the insoluble chlorides and those that split up the gold and to some extent lead, are recovered by saturating the solutions on the lower shelves—the chlorides following the laws of preferential solubility. This procedure may permit a ready method of separating the gases of combustion from the chlorides, but it results in a mixed insoluble product which must be refined.

Despite the value of the presence of sulphurous and sulphuric acids in the condensing tower, as described by Mr. Croasdale, one is inclined to question, first, the necessity of the sublimation of much SO_2 and SO_3, and, second, the value of transforming lead and copper into sulphate for their better recovery; for chloride of lead can be concentrated out of cupric

chloride solutions, and it surely does not need as much iron to precipitate copper from a chloride as from a sulphate solution.

It should be noted in summary that volatilization methods generally are conducted with far more ease on a large scale than with laboratory methods and amounts on account of the aid of mass action; therefore any volatilization process that is complete in laboratory should be conducted at least as completely on a large scale, and the temperature of the latter should be lower rather than higher than laboratory works. One is therefore unable to understand the necessity for the high temperatures cited by Mr. Croasdale, unless speed is desired regardless of efficiency.

Chloridization is practically complete at 650° C., and volatilization often commences at this temperature; why should 500° C. more be necessary to complete an operation already begun at the lower temperature? HENRY A. MATHER.

New York, August 25, 1903.

THE SAMPLING AND ESTIMATION OF ORE IN A MINE.

(*Continued from page* 305.)

To the Readers: Gentlemen:

Mr. T. Lane Carter and Mr. G. A. Denny have enriched the discussion by their descriptions of South African practice. Nowhere in the world is sampling so nearly an exact science as in the mines of the Transvaal, simply because these contain ore deposits of such persistence and uniformity that they afford the basis for careful work. The stuff is there, and it is not so erratic in occurrence or in richness as to upset calculations founded upon the doctrine of averages. After all, the value of any system must depend upon the comparative regularity of conditions assumed to exist by the mere fact of a regularity of method. Stereotyped procedure is stultified by the want of some measure of uniformity. For these reasons, the engineers on the Rand have had a great opportunity to improve sampling methods. This they have abundantly done. One of the best systems is the scheme of a continuous section-plan, proposed by Mr. F. Burnham, which has been adopted by several mines, and is described by Mr. Denny. By indicating the average assay of separate lengths of reef by means of tints upon the mine map, it is possible to get, at a glance, the relative value of the workings; the unit is a full stoping width, so that the tints mean not the gold contents per ton of any streak or vein, but the value as stoped—a very different thing. This continuous section-plan is of great service to the management of a large mine. When supplemented by the sampling record, which contains a continuous sketch of the distribution of the pay-streaks in a wide vein, as shown in the drawings given by Mr. Denny, this system affords, in a compact and logical manner, a great deal of the vital information necessary to good management.

Mr. Denny pleads for a minimum of 5 ft. as the sampling interval, and quotes differences observed when a longer interval has been adopted. It is obvious that the shorter the interval the more accurate the averages obtained, for every interval represents a column of ore having the length of the interval, the width of the ore, and the height of the block. The last dimension is shared, usually, with a corresponding sample on the next level. In practice the interval is usually determined by the exigencies of time and expense. When a mine is well organized and has men who are told off to attend regularly to the sampling of the workings, it is practicable to reduce the interval and do the work up to the extreme of detail; when, on the contrary, an engineer is sampling a mine preparatory to submitting a report upon it, he is apt to be limited by time and by the funds placed at his disposal by his client; as a consequence, he cannot spend all summer on one examination. It depends as much upon the client as the engineer; the better class of the former will not hurry the work and will not stint the expenditure necessary to do it well. One can only say that the engineer cannot be too careful, and to that end he will endeavor to find time and money sufficient to take samples at the shortest interval required by the nature of the lode. In one mine, quoted by me, I sampled every three feet, and even then the interval was short enough, seeing that the vein averaged 4 inches of ore carrying 500 oz. of silver per ton; in other cases, of uniform low-grade pyritic lodes, a 20-ft. interval would give closer results than the 3-ft. interval in the case just referred to.

Mr. Denny pleads for the general expression of values in terms of currency. This is a good point. Ounces of gold mean bullion of uncertain value; ounces of silver, percentages of copper, lead, etc., vary in value with changes in the market. Mining is a matter of money. I remember hearing of the case of an engineer who examined an Indian mine in the early days of the Wynaad, and instead of using the assay-ton he employed the old-fashioned percentage method, with the result that he misplaced the decimal point! A colossal blunder followed. If he had used currency instead of percentages as his unit, he would not have made such a fatal slip. Furthermore, mining operations nowadays cover regions of such diversity that the bullion contents may range from a 50 per cent alloy to gold of 995 fineness. To report in quantity of bullion is only to afford one more chance of misunderstanding, and, after all, the purpose of all engineering work is to get at the facts and then to state them beyond the peradventure of misconception.

Mr. T. Lane Carter describes current practice on the Rand and the arrangements made by the mine management for the regular sampling of the workings. It is plain that at Johannesburg the sampler has won a distinct position for himself. Incidentally he accentuates the usefulness of correct assay plans as indicating the value of any portion of the reef which is too poor to be worked now, but may be found profitable under more favorable economic conditions. When that time comes, an accurate record of the values, as determined by daily sampling of the drifts will be found of great service. The use of surveyor's points to locate the places sampled is a good scheme, since other points of departure may become obscured. Furthermore, it suggests the friendly relations which should exist with the surveyor's department; in fact, it would be well in most mines to put the sampling work, and the records of it, under the charge of the surveyor attached to the property.

Mine sampling on the Rand has been developed to the dignity of a distinct branch of practice; therefore, Mr. Denny's description of the methods in vogue is most opportune. His criticism in regard to the ascertainment of the "average value of the ore in the past" from "the records of a mine" is due to a misconception of my meaning. I meant the value per ton, as treated, in the mill or smelter, of the ore produced in the past, and not the average yield of the ground which has been removed by stoping. I quite agree with Mr. Denny that it is difficult to arrive at the yield per fathom, or per square foot, of lode in workings which have been abandoned; and, of course, we are well aware that many a false notion of the grade of lode contents has arisen from a literal acceptation of the story told by mill and smelter records. On the other hand, if the examination of a mine extends over several months, it is occasionally possible to check sampling results by measuring a block of ground and then getting the actual yield of it in tons of ore and in ounces of bullion. There are also instances where the management of a mine is in honest hands—for all sellers of mines are not dishonest, nor are all buyers immaculate—and then it may be that the stope-maps have been kept in such a way that the yield per fathom, the average width of clean ore as compared to the stoping width, the percentage of sorting, and other data can be secured and utilized as a check on the estimates based on sampling alone.

Mr. J. H. Curle taps the milk in the cocoanut in his contribution on mine valuation. It is the net profit that an engineer is asked to determine, all the rest is noise and smoke—tonnage of ore, assays, machinery, water power, timber rights, dump facilities, scenery—all these are mere frills on the outside of the essential problem: how much money will the mine yield? This is being recognized more and more; twenty years ago it was customary to make a perfunctory trip through the underground workings, to break off a specimen or two, and then to spend a few days copying the past records of production, getting tracings of the maps and interviewing the oldest inhabitants. With such data, it is no wonder that mine reports became a thing for derision. It is just such plain talk, straight from the shoulder, as this of Mr. Curle's, which goes to the heart of the problem and brings the thoughtful engineer into touch with the financial side of a great industry; it means the passing of the professor type and the development of the experienced engineer, who knows human nature and the brutalities of the financial arena no less than the contents of text books and the talk of the library.

There is no doubt that Mr. Curle is right in saying that the environment of the English engineer is against him in this respect. In America the engineer deals directly with a capitalist who usually knows a bit about the business of mining, but in London he is apt to run against a wholly impossible type, the middleman to whom the mine is merely the basis for clever dealing or the titled incompetent who is in the hands of the former and plays a part like that of the Indian whose wooden image stands in front of the cigar store.

Mr. Curle speaks of a mine valuer taking certain risks in figuring out the ore reserves; it is not in the estimates of ore blocked out that the chances of error are so great as in appraising the future prospects, the "goodwill," as it were, of the property that the largest margin for difference will occur. Mines are not bought only for the ore actually calculable in the existing workings, but also with the idea of a future enhancement in value due to intelligent development. Here it is where a man must be true to himself, and to his employers, by facing the facts frankly; and if the facts are insufficient to warrant a forecast, let him dig them out by further investigation. If they are not available after thorough examination of all the circumstances, then let the engineer say so frankly, to the end that his client may know just what risk he is taking; in many cases that risk may be warranted, in others the condition of the mine and its past history may render it out of the question.

Mr. Argall emphasises the necessity for taking samples of approximately equal weight; this is important. Of course, the samples will vary in bulk with the width of the lode; the amount broken should be equal per foot of cross-section. When it is left to such accidental factors as hardness and accessibility to fix the size of the sample, you simply introduce an unnecessary element of error, because excess of ore broken means usually that it came from a soft part of the lode, while a meager sample will coincide with extra hardness. In most lodes the difference in ease of fracture is due to some constituent mineral, the presence of which is likely to coincide with a variation in the value of the ore.

It is good practice to brush the face clear of dust or remove any mud which is not in place, because this foreign material frequently contains finely powdered sulphides which may vitiate the sample, especially in a low-grade gold ore. Mr. Argall makes several other good suggestions, such as that of allowing two gangs of samplers to take alternate intervals in sampling, thereby checking each other's work. As to the use of a hand rock-breaker, that is almost imperative where a big mine is being investigated; it will facilitate the careful quartering down of samples.

T. A. RICKARD.

New York, Aug. 5, 1903.

(*To be continued.*)

ACROSS THE SAN JUAN MOUNTAINS.

By T. A. RICKARD.

(*Continued from page 308.*)

The Golden Fleece vein strikes east and west, approximately; it dips southward at the rate of 33 ft. in 380 ft. In depth it flattens, so that the hade for the lower workings is only 150 ft. in 1,120 ft. In the accompanying drawing, Fig. 6, the upper workings and the geological conditions are both represented. The vein penetrates fine-grained breccia and tuffs, of the San Juan formation, until it abruptly runs into a very coarse breccia, where it scatters out and ends. The coarse breccia lies on the top of the finer series at an angle of 28°; the difference in the rate of erosion renders the change of rock very easy to recognize at surface, even if the abrupt cessation of the conspicuous outcrop did not incite close observation. The outcrop makes a comb, as much as fifty feet in height, of hard sintery quartz which, on examination, is readily seen to be a decomposed and silicified breccia, exhibiting various degrees of silicification from the vein itself, which is almost entirely quartz, to the outer country, in which the original structure is but slightly obscured. In this outcrop there have been—and still are—found irregular patches of extremely rich ore. In the underground workings it can be seen that the vein itself follows a line of fracture and brecciation; the twice brecciated country has been re-cemented with siliceous waters, so as to form a 'vuggy' or cellular veinstone. Pieces of country are to be seen enclosed within a coating of quartz. The sheeting of the rock explains the multiplicity of walls and ore-seams which confused those who have at various times exploited this vein.

The outcrop ceases when the vein encounters the coarse breccia; so, also, in the underground workings the vein itself comes to an end with a suddenness which is, however, only comparative. The contact (A B) has been considered a fault; a good deal has been said concerning its regularity and clean-cut character. This, however, does not, I believe, accord with the facts. The so-called "fault" is not a break or dislocation in the rocks, it merely marks the division between the layers of fine-grained breccia and an overlying formation of very coarse breccia; there is no smooth plane or wall or defined parting between these two formations, but only a sudden transition which at a distance is more marked than near-by.

The orebody of the mine was found in a triangular block of ground bounded on the one side by this "contact," A, B, on the other by the hillside, B D, and along the base by the No. 3 tunnel, A D. The outcrop was patchy and impoverished by leaching, the evidence of which is marked. This robbing of the croppings probably enriched the vein a little lower down. A branch vein, called the Ilma, which comes in from the northeast, appears to have played a part in determining the eastern or outer limits of the orebody.

Speculation concerning the causes which determined this occurrence of rich ore is not hampered by too many facts. A correct explanation suffers from the lack of them. The contact existed before the vein was formed. The fracture, followed by the ore, passed easily through the finer grained rock, but ceased abruptly when it met the beds of coarse breccia, because the force of fracturing was not only insufficient to overcome the resistance of the harder fragments contained in the latter, but it must have been dissipated by the encounter with a loose-textured body of rock, much in the way that the power of a diamond drill becomes wasted in passing into a shifting mass of loose conglomerate. As a consequence the energy of shattering was diverted along the contact, the vein fracture ceased and the later ore-depositing waters were barred from further advance into the coarse breccia, save as a scattering confined to the neighborhood of the contact. At the third level the orebody, occurring in the fine-grained country, was notably wider immediately at the "contact" and in examining the outcrop of the vein I noticed that it was difficult to decide upon the exact line of separation between the two formations, because the mineralization extended from the fine into the coarse breccia so as to obscure the divisional plane.

The deeper levels have found some small bodies of ore and a good deal of money has been obtained from isolated bunches all the way down to the main tunnel or adit, about 700 ft. below the third level. Several larger bodies of low-grade ore have also been encountered in the deeper workings. Exploratory work is still going on, especially near the contact, where the chances for finding more ore seem to be reasonably good.

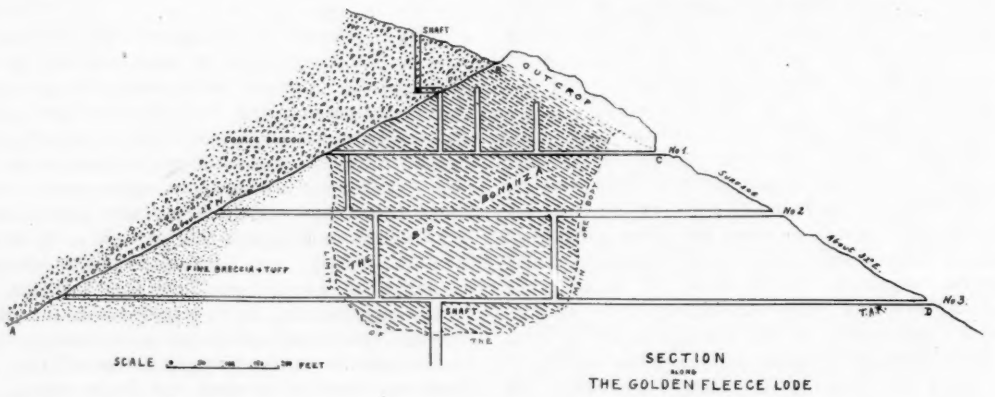

FIG. 6

Most of the rich ore of the Golden Fleece mine was shipped to the smelters, but the low-grade mill-stuff was treated on the spot. As the values were chiefly contained in telluride minerals (principally petzite, but also some hessite) the treatment—by concentration—presents features of interest. The mill was of latest design, erected by Stearns, Roger & Co. It consisted of rolls, for crushing, Huntingdon mills for re-grinding, Wilfley tables for concentration and a canvas plant for slimes. No use was made of amalgamation. The Huntingdons were provided with screens of 30 mesh, and experience showed later that 20 mesh would have been better. In treating 18,000 tons having an average assay value of $10.25, half of which was in gold and half in silver, the extraction averaged between 45 and 60 per cent; 63 per cent was the best result. The concentrates contained 55 to 65 oz. of silver, 1 to 3 oz. gold and 12 to 18 per cent lead, in the form of galena. The concentration was in the ratio of 12 to 1. It may be said that the experience with this ore indicated conclusively that a simple mill,[1] with Wilfley tables and an extended canvas plant as the principal features, would have been adequate.

We remained for two whole days with Mr. Peirce, and early on the 12th of September our journey was resumed. In crossing the valley of the Lake Fork of the Gunnison one cannot help noting the peculiarities of the surface. The eastern range, opposite the mine, is marked by a depression known as Slumgullion gulch. As seen from No. 3 tunnel it looks like a mud landslide, the steep slopes of which have been obscured by weathering. However caused, it has extended down to the valley and dammed the stream so as to form Lake San Christobal. It is said, by those living on the lake shore, to be still in motion and to be extending further across the valley. Slumgullion is commonly imputed to glacial action, but the observed facts do not require us to go so far afield. Landslides, some of them of great extent, dating back to early Pleistocene time, have been recognized and carefully studied in the Telluride and Rico regions.[2] They are attributed to the penetration of water along bedding planes and other lines of parting. In the case of Slumgullion the porosity of the coarse layers of breccia permitted of the entrance of water, which would reach down until a less porous stratum was encountered and then, if the dip slope was toward the valley, the conditions would be ripe for a landslide. The geological conditions observed in the Golden Fleece mine would favor such movement if the bedding planes dipped with the hillslope; they dip right into the hill, however, and as a consequence the surface slopes steeply, at 30 degrees and over. The same geological structure if carried across to the *other* side of the valley would explain the landslide of Slumgullion. In the earlier history of these mountains they were bolder than they are now, and when, at the close of volcanic activity, earthquakes supervened, then the landslides occurred on a colossal scale and were accompanied by a shattering of the rocks, covering areas extending over many square miles.

The ascent of Slumgullion was easier than it sounds and as we filed along we were reminded by the mention of the Cannibal Plateau, which arose in bleak ruggedness to our left, of a tragedy the details of which no human witness has truthfully told. In 1873 a party of prospectors, intending to go to Fort Garland, in the San Louis valley, found their way up the river which we had left. It was a very severe winter, so that game was scarce; they were verging on starvation, and on their last legs. Out of the five men, one, named Parker, survived; he claimed that he went out into the woods hunting and on his return one of his comrades, rendered mad by hunger, attacked him with an axe, so that he had to shoot him in self-defense. Then the other three set on him, so that he had to kill them also. It is generally believed that Parker killed them to get the money they are understood to have carried. Game was not so scarce as he represented; at all events he managed to support himself until he worked his way out, and finally reached Durango, where he was subsequently arrested, convicted and sentenced to life imprisonment. Two years ago he was liberated by the then Governor of the State. In his gruesome story he confessed to having been compelled by hunger to eat portions of his victims; hence the ominous name, which like the gloomy brow of the Cannibal plateau itself overshadows the fair valley of San Christobal.

THE CHEMICAL TRADE OF JAPAN.—There has been great improvement in the consumption of industrial chemicals in Japan in recent years, owing to the general business activity. The imports of chemicals show that British manufacturers satisfy the bulk of the Japanese consumption. In 1902 the imports at Kobe and Osaka included 11,436,408 lb. soda ash, 10,790,224 lb. caustic soda, 7,020,297 lb. chlorate of potash, 588,579 lb. phosphorus, and 2,329 tons ammonium sulphate.

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[1]The mill was really designed for an ore containing galena and iron pyrite, both of which proved unimportant ingredients when the mine became further developed.

[2]Hayden recognized them, Whitman Cross describes them in the Telluride folio and they are found carefully considered by him in Chapter V. of "The Geology of the Rico Mountains." Pp. 129-151.

FATAL ACCIDENTS IN COAL MINES IN NORTH AMERICA, 1902.

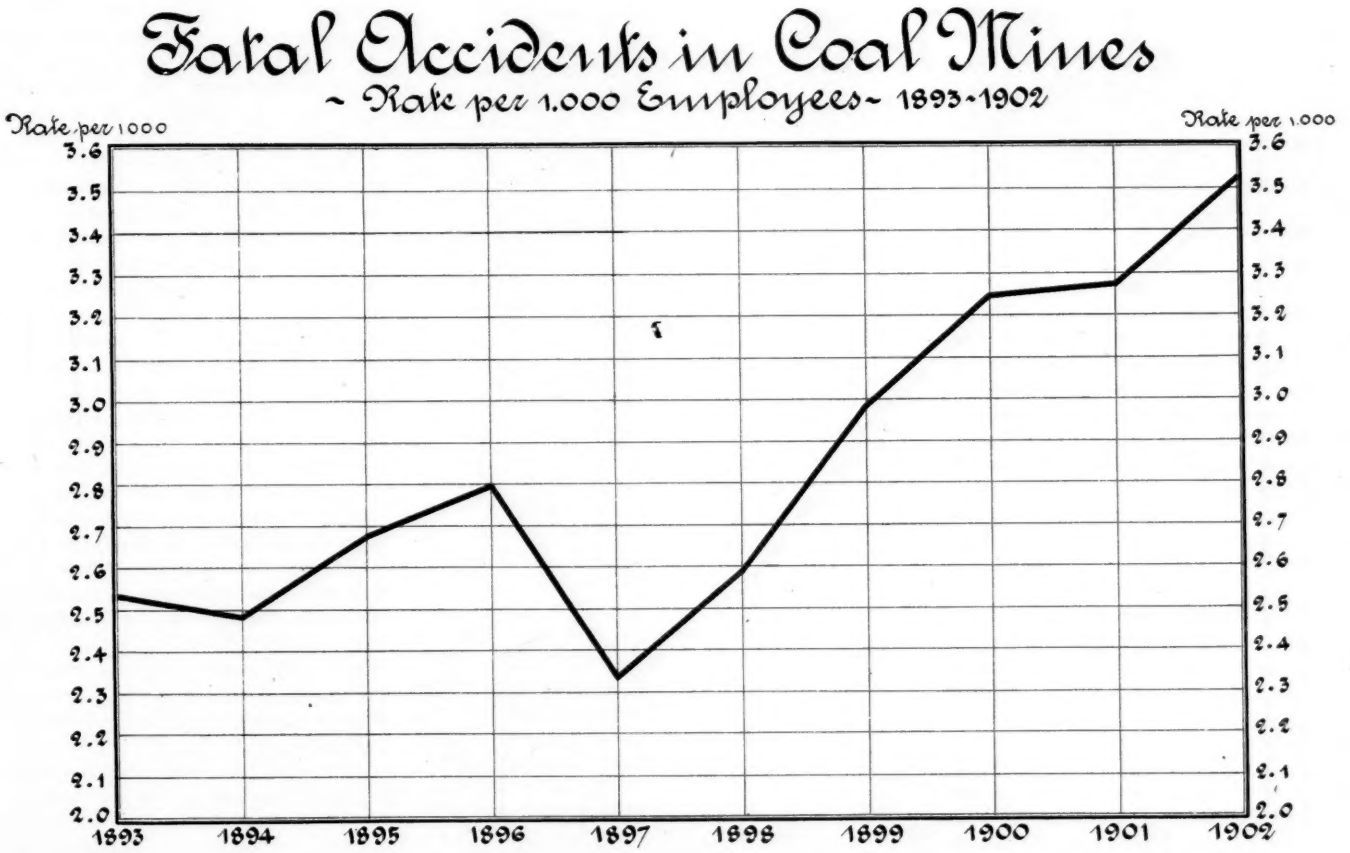
By FREDERICK L. HOFFMAN.

During 1902 the fatal accidents in the coal mines of North America caused the loss of not less than 1,749 lives, which, in proportion to the number employed, is equivalent to a death rate of 3.52 per 1,000. Compared with the average of 2.76 for the 10-year period 1892-1901 the record is evidence of a very material increase in the accident liability of coal miners. In contrast to the general and marked improvement in the health conditions of men employed in American industries this record is not a satisfactory one. A review of the rates for previous years, in particular since 1897, shows that the rate has gradually increased from 2.34 per 1,000 during that year to 2.98 in 1899, 3.27 in 1901, and 3.52 in 1902. But for the long drawn out labor conditions in the anthracite coal region in Pennsylvania, extending over a period of twelve weeks, it is highly probable that the rate for 1902 would have been still higher. The record is unfortunately not quite complete in that the returns for two States—Indiana and Iowa—have not been furnished. If the reporting of mining casualties serves any useful purpose, it would seem the least to expect of state officials or of the statutory requirements that the facts should be made public as near to the close of the calendar year as possible. The first table of the series gives the number of persons killed by accidents in coal mines in the United States and Canada during the 10 years 1893-1902. The second table gives the corresponding rates per 1,000 of persons employed in all of the states and provinces, as far as the information could be obtained, during each of the years of the period under consideration. For years previous to 1892 the reader is referred to the volumes of THE ENGINEERING AND MINING JOURNAL subsequent to 1897, and to THE MINERAL INDUSTRY, Volume VII., for the year 1897.

NO. 1.—NUMBER OF PERSONS KILLED BY ACCIDENTS IN COAL MINES IN THE UNITED STATES AND CANADA—1893-1902.

	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	Total.
Alabama	17	19	38	28	38	45	40	37	41	50	353
Colorado	46	19	23	68	35	24	41	29	55	73	413
Illinois	69	72	75	77	69	75	84	94	99	99	813
Indiana	22	x	23	28	16	22	16	18	x	x	145
Indian Territory	x	13	6	12	22	17	25	40	44	60	239
Iowa	29	19	20	22	21	26	20	29	26	x	212
Kansas	15	26	10	12	6	17	16	22	26	27	177
Kentucky	12	10	8	6	12	6	7	17	21	19	118
Maryland	5	7	9	6	5	4	5	7	12	11	71
Missouri	21	19	13	16	8	9	14	10	15	10	135
New Mexico	x	x	28	7	7	7	15	15	9	17	105
Ohio	32	45	52	41	40	52	57	68	72	81	540
Pennsylvania (Anthracite)	456	446	421	502	423	411	461	411	513	300	4,344
Pennsylvania (Bituminous)	131	122	156	180	150	199	258	265	301	456	2,218
Tennessee	11	14	37	22	10	19	20	10	53	226	422
Utah	x	x	1	3	3	3	..	209	10	8	237
Washington	9	50	35	8	7	9	45	33	27	34	257
West Virginia	72	59	83	65	62	90	89	141	130	120	911
British Columbia	16	4	10	9	6	7	11	17	102	139	321
Nova Scotia	2	13	9	8	7	7	19	21	14	19	119
Total Deaths	965	957	1,057	1,120	947	1,049	1,243	1,493	1,570	1,749	12,150

x No report.



NO. 2.—FATAL ACCIDENTS IN COAL MINING IN THE UNITED STATES AND CANADA—1893-1902.

Number of Persons Killed per 1,000 Employed

	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	Total.
Alabama	1.89	2.13	4.61	2.83	3.07	4.55	3.10	2.59	2.90	2.79	3.00
Colorado	6.31	3.06	3.05	10.07	4.99	3.23	5.60	3.99	6.88	8.11	5.59
Illinois	1.95	2.21	2.35	2.33	2.04	2.14	2.27	2.39	2.24	2.15	2.21
Indiana	2.96	x	2.92	3.94	2.00	2.63	2.07	1.82	x	x	2.57
Indian Territory	x	3.95	1.64	3.26	6.34	4.82	6.24	7.59	8.35	9.62	6.22
Iowa	2.77	1.85	1.82	2.62	2.45	3.38	2.49	2.22	1.97	x	2.34
Kansas	1.52	2.58	1.11	1.36	0.71	1.95	1.57	2.06	2.28	2.70	1.82
Kentucky	1.41	1.25	1.02	0.79	1.55	0.67	0.83	2.06	2.14	1.58	1.35
Maryland	1.23	1.69	2.30	1.58	1.17	0.89	1.08	1.32	2.23	1.99	1.56
Missouri	2.70	2.49	1.84	2.43	1.22	1.22	1.80	1.31	1.63	1.09	1.76
New Mexico	x	x	16.88	4.87	5.13	3.71	7.98	7.44	4.81	10.11	7.61
Ohio	1.11	1.43	1.79	1.44	1.39	1.77	2.03	2.14	2.15	2.16	1.76
Pennsylvania (Anthracite)	3.30	3.19	2.93	3.35	2.83	2.89	3.28	2.86	3.47	2.03	3.01
Pennsylvania (Bituminous)	1.60	1.44	1.83	2.14	1.72	2.27	2.82	2.43	2.56	3.37	2.30
Tennessee	2.21	2.53	7.23	3.37	1.58	2.43	2.60	1.15	6.10	25.80	6.01
Utah	x	x	1.49	4.35	4.17	4.38	..	138.96	5.81	3.24	24.75
Washington	3.18	14.79	12.38	2.98	2.48	2.70	13.60	7.79	5.59	7.83	7.43
West Virginia	4.20	2.98	3.97	2.68	2.89	3.86	3.55	5.03	4.01	3.78	3.73
British Columbia	5.63	1.37	3.42	3.27	2.47	2.34	2.91	4.22	25.67	34.65	9.83
Novia Scotia	0.34	2.41	1.55	1.33	1.35	1.56	3.39	3.17	1.83	2.36	1.96
Total	2.53	2.48	2.67	2.79	2.34	2.59	2.98	3.24	3.27	3.52	2.87

x No report.

The first table, as already stated, shows a loss of 1,749 lives in the coal mining operations of North America during 1902. This statement falls short by probably from 5 per cent to 10 per cent of the actual number, in that the record is not complete for all of the states, and casualties are not reported for a number of small mines which do not fall within the scope of state supervision. There is also a further margin of error in the inherent difficulty of reporting fatal accidents resulting from mining casualties weeks, or months, and even years after their occurrence. The actual loss of life as the result of coal mining operations is probably not far from 2,000 per annum. The highest rate during the year was in British Columbia, assuming the enormous proportion of 34.7 per 1,000 persons employed. The next highest rate was in Tennessee, followed by New Mexico and Indian Territory. The most favorable rates were in Missouri, Kentucky and Maryland. The averages for the 10-year period show results corresponding quite closely to those of former years; the Western states showing almost without exception a more unfavorable experience than the more thoroughly developed coal fields of the East. There is a marked falling off in the fatal accident rate of anthracite mining in Pennsylvania, from 3.0 for the 10 years 1893-1902 to 2.0 during 1902. This result is largely, if not entirely, due to the strike extending over a period of six months, during which no mining was carried on.

The rate of 3.52 per 1,000 for 1902 was the highest on record for the decade under observation. Compared with the average of 2.76 for the 10 years 1892-1901 there has been an increase in the accident liability of coal miners of 0.76 per 1,000 during the year, which must indeed be looked upon as a most serious indication of unsatisfactory conditions regarding the lives and welfare of persons employed in the coal mining industry. A more detailed comparison of the experience in different states is made in the following table, which shows the average number of persons killed during the five years 1897-1901 and the corresponding information for 1902, together with the rates per 1,000 employed and the resulting increase or decrease in the rates during 1902.

NO. 3.—FATAL ACCIDENTS IN COAL MINES IN 1902, COMPARED WITH FIVE PREVIOUS YEARS

	Number of Persons Killed. (Yearly Average) 1897-01.	1902.	Rate per 1,000 Employed. 1897-01.	1902.	Increase or Decrease per 1,000 Employed. 1902.
Alabama	40	50	3.16	2.79	— 0.37
Colorado	37	73	4.97	8.11	+ 3.14
Illinois	84	99	2.22	2.15	— 0.07
Indiana	x18	x	2.12	x	x
Indian Territory	30	60	6.87	9.62	+ 2.75
Iowa	24	x	2.42	x	x
Kansas	17	27	1.76	2.70	+ 1.06
Kentucky	10	19	1.26	1.58	+ 0.32
Maryland	7	11	1.37	1.99	+ 0.62
Missouri	11	10	1.45	1.09	— 0.36
New Mexico	11	17	5.88	10.11	+ 4.23
Ohio	58	81	1.91	2.16	+ 0.25
Pennsylvania (Anth.)	444	300	3.06	2.03	—1.03
Pennsylvania (Bitu.)	235	456	2.38	3.37	+ 0.99
Tennessee	22	226	2.85	25.80	+22.95
Utah	45	8	39.15	3.24	—35.91
Washington	24	34	6.53	7.83	+ 1.30
West Virginia	102	120	3.93	3.78	— 0.15
British Columbia	29	139	8.71	34.65	+26.34
Nova Scotia	14	19	2.30	2.36	+ 0.06
Total	1,262	1,749	3.05	3.51	+ 0.46

x Returns for Indiana not available for 1901 and 1902; nor those for Iowa for 1902.

This table requires no detailed analysis. It is conclusively shown that there has been an increase in the accident rates of most of the important coal mining states. A marked exception to the almost general rule of less favorable conditions during 1902 is found in the returns for Illinois, where there has been a decrease in the rate equivalent to 0.07 per 1,000 and in the returns for Missouri, where the rate has declined from an average of 1.45 to 1.09, or 0.36 per 1,000.

For purposes of comparison a table is added for the decade 1893-1902 showing the number of persons employed, the number killed and the rate per 1,000 for each of the years under observation.

NO. 4.—A DECADE OF FATAL ACCIDENTS IN COAL MINING IN NORTH AMERICA—1893-1902.

	Employes.	Killed.	Rate per 1,000.
1893	382,133	965	2.53
1894	385,579	957	2.48
1895	395,549	1,057	2.67
1896	401,874	1,120	2.79
1897	405,433	947	2.34
1898	405,600	1,049	2.59
1899	416,596	1,243	2.98
1900	460,670	1,493	3.24
1901	480,433	1,570	3.27
1902	497,887	1,749	3.51
1893-97	1,970,568	5,046	2.56
1898-02	2,261,186	7,104	3.14
Total	4,231,754	21,150	2.87

For Indiana, 1901 and 1902, and for Iowa, 1902, the information is not available.

This table is illustrated by a diagram to emphasize the importance of the subject. It is shown that the rate has increased from 2.53 in 1893 to 3.52 in 1902, or from 2.56 per 1,000 during the first five years to 3.14 during the last. In the aggregate over 12,000 lives have been lost in coal mining operations in the ten years under observation. Seven thousand one hundred and four lives were lost during the last five years, which is 1,315 more than would have been the case had the average rate of 1893-97 prevailed during the last five years. The subject is evidently one which requires more careful consideration than it has thus far received in this country.

A QUICK WAY OF PREPARING SECTIONS OF ROCKS.

By Geo. L. Mackenzie.

In the geological examination of a mining property, the engineer will have little difficulty in naming the coarsely crystalline rocks by merely examining hand specimens with a lens; but when he is confronted with more finely crystallized specimens, resort must often be had to the microscope. Fortunately, the preparation of thin sections of rocks for microscopic slides has been greatly simplified by the recent invention of the abrasive material known as carborundum, which is manufactured in the electric furnace from a mixture of coke, salt, sawdust and sand. It is supplied both in powder and in solid pieces of various shapes. The powder is already displacing emery in the preparation of rock sections, but the dirt inseparable from the use of wet powder and the continual trouble of keeping the grinding slab or wheel properly covered with the powder caused the writer to experiment with solid slips of carborundum with quite satisfactory results. After a little practice a man can, in about three-quarters of an hour, prepare a section quite good enough for the determination of its constituent minerals. With a fairly soft rock, a thin flake can be ground down and the first look at it got through the microscope in about twenty minutes. The process is so clean that it can be carried out on a newspaper spread on the sitting-room table, and the necessary appliances are so few and small that they can be carried in the coat pocket.

Material for sections can easily be got from any angular piece of unaltered rock by knocking thin flakes off one of its edges. Schists will, of course, cleave along the planes of schistosity, and if sections across these are desired, they may have to be cut from fairly thick chips by the usual thin iron slitting-disc with its edge armed with diamond dust; but this is very rarely necessary for the mere naming of a rock.

The equipment required for grinding is: a little Canada balsam dissolved in turpentine; a few pieces of glass about 1½ ins. square and ¼ in. thick, on which to stick the flakes of rock for the preliminary grinding; two slips of carborundum, one fairly coarse-grained for the preliminary grinding and the other very fine for the last stages; some thin slips of glass on which to mount the sections, and some very thin discs of glass to cover them when mounted; some turpentine or methylated spirit and a small stiff paint-brush to wash off superfluous balsam. Toluol is a very rapid solvent but is not always easily obtainable. The most convenient size of carborundum slips is rectangular, 4 ins. long, 1 in. broad and ¼ of an inch thick.

When starting to grind the section a small bowl of water should be on hand. Wet the coarser of the carborundum slips and, holding the flake of rock between the finger and thumb, or under the point of the finger (if very small), rub it in circles on the carborundum, which must be kept wet. When the whole of one side is flat, finish the grinding on the fine slip. (If good work is desired, give the section a final polish on a small piece of Water of Ayr stone.) The face which has been thus ground on the specimen is one of the sides of the section when finished. Wash it in clean water and see that it is quite flat and has no scratches on its surface.

Take a thick glass square, warm it, put on it one or two drops of Canada balsam and continue warming gently till the balsam has grown thick and is barely fluid, but on no account make it so hot as to cause bubbles of gas to form. At the same time warm the specimen; then lay it with the flat side down on the balsam and press it firmly down. See that there are no bubbles of air below it, for, if there are, the specimen may come off or break in grinding. To remove bubbles, heat again and move the specimen about to let them escape at its edges. When the glass is cool the balsam should be so hard that it can just be marked by the finger nail. If much softer the specimen will probably come off in grinding, and if much harder it will be difficult to get the specimen off the glass again.

The grinding is now continued as before, using gentle pressure until the roughness is worn off the specimen, otherwise it may be pulled off the glass. This is the only stage at which some time can be saved by using a treadle machine.

When the section is as thin as stout notepaper, it had better be transferred to the glass slip on which it is to finally remain. If ground thinner it is difficult to avoid its breaking up when being transferred. With the brush, wash all dirt and dirty balsam on the glass square. Warm some drops of balsam on the glass slip as was done on the glass square, then heat the square containing the section till the balsam grows fluid and the section can be pushed off with a wire or pin and allowed to fall upon the balsam on the glass slip. Cautiously warm the slip again to make the balsam more fluid, then, with the unsharpened end of a pencil, press the section gently down till it seems to touch the glass. If there are any bubbles below the section, it must be moved about gently till they escape, reheating if necessary. It may even be necessary to take the section and add fresh balsam, heating it as before to thicken it.

Grinding may now be continued cautiously on the finest carborundum slip, but if the balsam is so soft as to be quite easily marked by the finger nail there is certain to be trouble. The remedy is to continue heating gently, then press the section down to the glass again, as it is sure to rise. It is difficult to avoid scratching the glass when grinding, but where time is an object, a few scratches matter little, as they in no way interfere with the examination of the section itself. Bubbles below the section are much more unsightly.

When the section appears thin enough, lay it face down on a piece of newspaper, and if the print can be easily read through it, try the slide under a microscope; but first wash off all grit; dry the glass and then just moisten the section to render it more translucent. If it appears rather opaque and there is a difficulty in finding the exact focus with a fairly high power, it is probably too thick. Go on grinding very gently and see that there is some balsam all round the section to prevent pieces breaking off its edge. (A final polish on Water of Ayr stone is an improvement, but not indispensable.) When finished, wash off all dirt with water, then with the brush and turpentine wash off the balsam round the section.

To put on the cover-glass, place several drops of balsam on the section. Warm cautiously so that

the balsam when cool will be pretty stiff. Then lay the cover-glass on it, move it about to cause any bubbles of air to escape at the edges, then press it down till it seems to touch the section, and leave it to cool. Wash off all superfluous balsam, label the side with locality and name of rock, and the work is done.

The above process omits some niceties of manipulation, but these will suggest themselves as experience is gained in the work. The chief difficulties lie in avoiding bubbles under the section or under the cover-glass, or scratches on the glass slip. Of these only the first is of much importance. Bubbles are avoided by not boiling the balsam. Scratches are avoided by putting a few spots of shellac on the glass slip or by nearly finishing the grinding before transferring the section from the glass square, but grief and pain are the lot of the beginner who tries to transfer a very thin section. When the original flake of rock is very thin, time may be saved by putting it direct on the glass slip instead of on the glass square. The sections made may not compare with the works of art turned out by such artists as Dr. Kratz's staff, but will be found sufficiently good for the purposes of a mining engineer.

PETROLEUM.*

By WILLIAM P. BLAKE.

The utilization of rock oil or petroleum, and the boring of the first well by Drake in 1859, were events of the utmost importance in the history of mining, and to the march of civilization.

The oozing of mineral oil from the ground, and its diffusion upon the waters of the creek had long before been observed. It was collected in small quantities for years and sold as a medicine. The water was either skimmed, or the oil was absorbed by blankets spread upon pools of water in tanks or trenches, or in salt wells. As early as the year 1845 the crude oil from Tarentum had been used as a lubricant in the Hope cotton factory. Attempts were soon after made to refine the oil for illuminating purposes. The younger Silliman at Yale was called upon to make an analysis and to advise respecting its treatment. The world was sadly in need of light. Experiments upon volatile oils distilled from coals had been numerous. An oil which could be used to replace the vile-smelling greasy whale oil in hand lamps was the great desideratum. Its use as an illuminant had been suggested as early as 1828.

The experiments promised success. A clarified distillate was obtained. Burners and chimneys of glass were devised. Perfect combustion and a brilliant light was secured. The next question was as to quantity. This was answered by the drill of Drake. The industry of petroleum was born. It has been said that "the discovery of Drake not only opened the door to material wealth, but to new avenues of human activity, mental and manual."

Oil in quantities in the remote forests of Pennsylvania required new methods, new machinery, new methods of storing and of transportation. Compare for a moment the movement of oil in barrels, on wagons and in flat boats down the creeks to the river, with the magnificent pipe-line transportation of today from the wells to the sea-board. Compare the original price of $20 per barrel for Drake's crude oil with the price of one dollar at the end of the century. Compare the cost of refined oil in 1860 at from 70 to 75 cents per gallon, with its present price of about 10 cents per gallon.

One oil-producing district after another has been added to our sources of petroleum, and of its accompaniment, natural gas. Both have been utilized as fuel and in metallurgy. The industry of iron and steel has been modified, almost revolutionized, by their use. Better products have resulted.

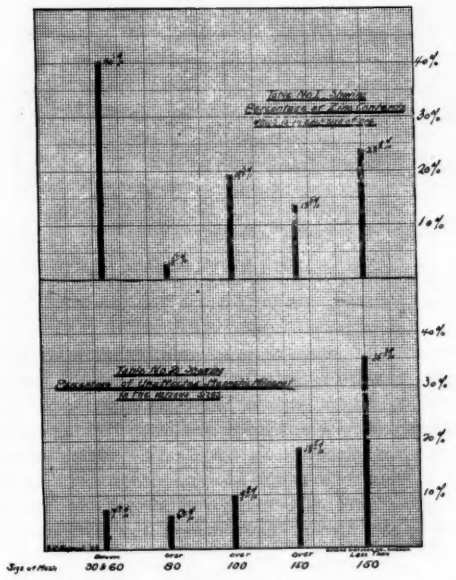
Oil is being substituted for coal upon some of our railways, and at our mills for reducing ores. It is destined to play a most important part in the smelting of ores.

*Abstract from address delivered to the Missouri School of Mines.

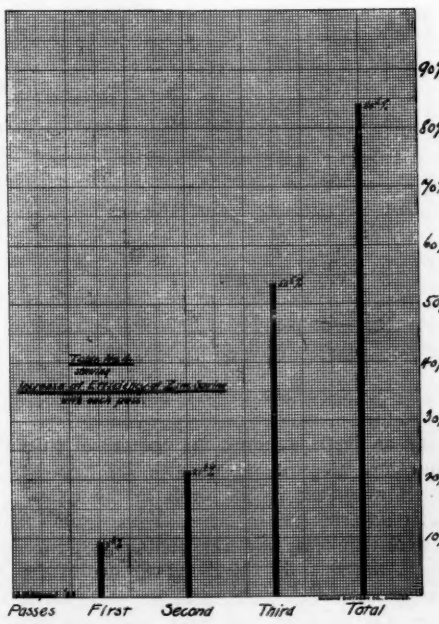
MAGNETIC SEPARATION OF ZINC ORES.

By SAMUEL W. OSGOOD.

The recent progress made in the concentration of ores by magnetic separation has been very great. Especially is this true with regard to zinc ores. In fact, it can almost be said that while for years the magnetic separation process was more largely used on other magnetic ores, of late, however, the preparation of zinc ores has been its greatest field. It has at least proved to be the field in which the use of magnetic separation has been brought to a very high state of efficiency; notwithstanding the almost insurmountable metallurgical difficulties with which is not susceptible to the magnet is seen to in- Every step, from the time the ore fell into the bin, until the finished product was delivered, has been fraught with problems all inherent in the adoption of a process little known to a new field of work, and in many cases new to the operator. In a number of plants the operators are to be complimented for the high state of efficiency that is now attained. In this connection it is interesting to note some results obtained at a plant with which the writer has had something to do.

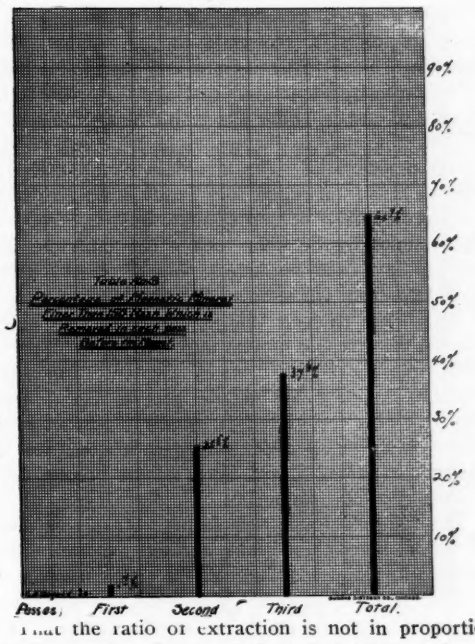


The great problem in the concentration of zinc ores has always been in the treatment of the fines. Table 1 shows that of the zinc contents in the ore treated here by magnetic separation, 23.9 per cent was contained in ore that would pass a 150-mesh screen. It should be stated here that Table 1 does not represent the crushing curve of this ore, by



reason of the conditions in the plant; it merely shows what erratic material one can treat successfully by magnetic separation. The ore in this case was passed several times before the magnet.

That a mineral which ordinarily is susceptible to magnetism becomes, on being ground finer and finer, less affected can be easily proved by mathematical deductions and that this actually is the case in practice is readily shown by Table 2, where the increase in the percentage of the magnetic mineral which is not susceptible to the magnet is seen to increase as the size decreases.



That the ratio of extraction is not in proportion to the number of passes before the magnet and consequently that repeated passages of this extremely finely powdered magnetic mineral before the magnet will not eventually remove all of it, is shown by Table 2; wherein results are platted that show, whereas the difference between the first and second pass is 23.8 per cent, the variation between the second and third pass is only 12.1 per cent.

The saving in percentage of zinc contents by this method is given in Table 4, as is also the saving effected by each successive passage of the ore before the magnet.

It might be further stated that at the present stage of development of this very interesting and commercially important branch of concentration, and with the conditions at the above plant taken into account, these results are considered as very good.

FOREIGN PRODUCTS FOR RUSSIA.—Much the larger part of the imports into Russia are from Great Britain, but in recent years Russian exports have grown, while imports have diminished. Some of the more important imports last year included 2,809,032 tons coal and coke, 8,339 tons bricks, 123,758 tons pig and bar iron, 9,451 tons steel billets, etc.; 2,209 tons steel plates, 4,339 tons tin, 18,552 tons fine copper, 42,984 tons lead, 10,532 tons zinc, and £5,063,981 worth of machinery, principally for agricultural purposes.

CEMENT MANUFACTURE IN GREAT BRITAIN.—According to the 39th annual report of the British alkali inspector, the use of rotary cylindrical kilns in cement manufacture in Great Britain is becoming more general. The cement industry in Great Britain is, however, depressed and several works are inactive. Complaint has been made of the emission of black smoke where dry powdered coal is used. These have led to the trial of oil for fuel at one works, but the fumes emitted have had a distinct and characteristic oder which is noticeable. At a factory on the Medway, three lives were lost from poison by carbon monoxide November 27. Attention is called to the necessity of keeping at hand a cylinder of compressed oxygen with means for its administration at all places where poisoning by carbon monoxide or other gases is likely to occur.

THE SANTA EULALIA ORE DEPOSITS.*

By PHILIP ARGALL.

About 15 miles southeast of the city of Chihuahua the Santa Eulalia Mountain rises in a gentle, tuff-capped fold, to a height of about 1,200 ft. above the plain. This mountain is massive limestone, and in it occur those rich and extensive deposits of silver-lead ores that for the past 200 years have made the mining district of Santa Eulalia one of the most famous in Mexico.

The geology is extremely simple. The Santa Eulalia Mountain is, according to Mr. Walter Harvey Weed, massive Cretaceous limestone.[1] Its main axis courses approximately east and west; the limestone dips gently under the plains along the southern margin, and, so the writer is informed, on the northern side also. The mountain would thus appear to be an anticlinial fold in the strata, with the chief ore deposits occurring along fissures mostly at right angles to the main axis. The limestone appears to have been weathered into a series of benches extending from the plain to the summit, and deeply eroded with narrow valleys, prior to the eruption of the volcanic breccia and tuff which filled up these valleys, overspread the benches and formed the cap now covering the greater part of the mineral district. This cap of tuff is usually a light-colored, rather fine-grained rock, known to the natives as *cantera;* it passes into a fairly coarse breccia containing limestone fragments.

This cap of volcanic rock forms, with perhaps one exception, the highest peaks, and extends well down toward the plain, rounding off the rough benches of the underlying limestone. Where the tuff and breccia extend 200 to 300 ft. in thickness, very little prospecting has been done until quite recently, hence the earlier maps of the district show large blanks, but in later years these have been pretty well covered with locations. In places deep shafts are now in progress through the 'cap rock' to reach the underlying limestone formation, which unquestionably extends uninterruptedly from the eastern to the western limits of the district.

The richer mines are at present the Potosi, Santo Domingo, Mina Nueva and Prieta, situated practically in the center of the district, while the western limits have such mines as the Santa Rita, Parcionera and Mina Vieja, all famous for their production, and the eastern portion of the district has the San Antonio, Mercedes and Santa Juliana. All excepting the last are old and famous producers. The Santa Juliana is a new mine now shipping largely from a cave discovered within 100 ft. of the surface.

Porphyry dikes or intrusions are, so far as present developments show, by no means plentiful. The San Antonio mine, on the extreme easterly limits of the district, and practically on the plain, is, however, on a porphyry dike, the ore making in the limestone on either side, often extending to a considerable distance along the bedding planes.

Immediately west of the San Antonio, and along the course of its dike, there is quite an outflow of porphyry, which assumes a rough, bedded appearance, and has been extensively burrowed by the Mexicans following small seams of ore, which occur irregularly throughout the porphyry, but at times follow the bedding structure somewhat closely.

I am informed that at least one porphyry dike exists in the Mina Vieja, while in the adjoining property I saw some evidence of intrusive porphyry at 1,000 ft. below the surface. The present development, outside of the San Antonio mine, does not show that intrusive porphyry has had any direct influence on the ore disposition in the district, yet I am led to believe that at greater depths, porphyries will be more plentiful, and that igneous rocks may, to some considerable extent, underlie the ore deposits.

The present proved thickness of the ore-bearing limestone is about 2,500 ft.—it will probably exceed 3,000 ft. in total thickness. This great limestone uplift appears to be singularly free from faulting. In seven mines which I partially examined, fissures and caves abound, but I did not see a single fault exceeding one foot displacement. The main fissures, often represented by an incipient fracturing, have an approximately north and south strike, and it is along these that the great caves, watercourses and ore deposits occur, more particularly where the small

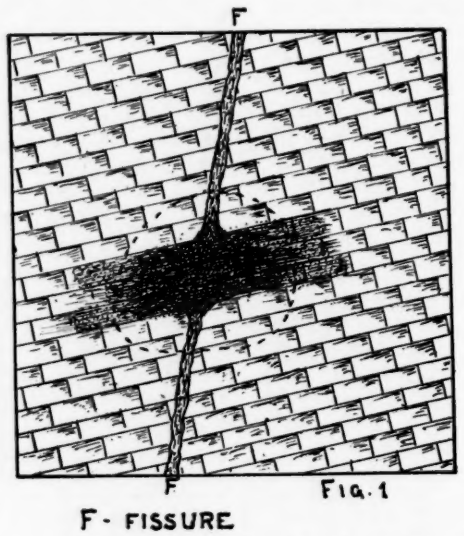


FIG. 1

cross-fissures intersect, a splendid example of which is the great ore deposit on the 1,450-ft. level of the Mina Nueva on the Santo Domingo line.

The Santa Eulalia ores are lead carbonates containing, in places, rich bunches of silver chloride, the average ore being of high tenor both in lead and in silver. The main ore masses are oxidized as deep as present development has proved them,

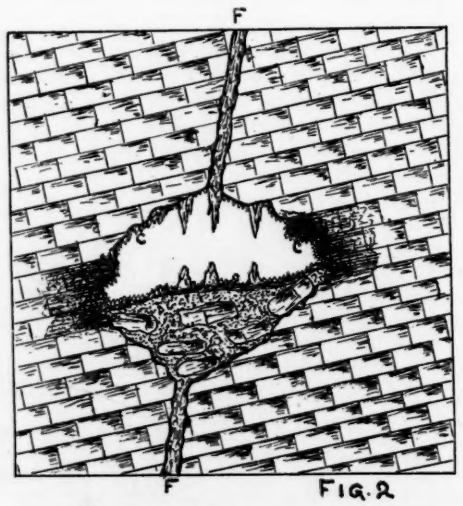


FIG. 2

though as depth is gained the nodules of galena become more plentiful, as do also the branches and veinlets of galena in the walls of the caves. The smaller deposits and branches off the main channels of circulation may, however, contain sulphides quite close to the surface. Much of the ore in the deep caves is an almost pure cerussite, and, taken altogether, the oxidized ores very much resemble the Leadville high-grade carbonates. The sulphides that I saw, at a depth of 1,400 ft. from the surface, in the Santo Domingo, were principally iron pyrite, and appeared to contain very little zinc and not much lead.

The fissures connecting some of the great cave deposits can be traced into the overlying tuff or 'cap rock,' carrying ore in both rocks and, in places, a small deposit at the contact. If this is the prevailing condition, the fissures and mineralization would appear to be subsequent to the ejection of the breccia and tuff, and are probably due to a later period of igneous activity.

While my limited observations lead me to adopt this view, I freely admit that it may not be correct; however, proceeding on this hypothesis, I would elaborate it as follows:

(1) Volcanic disturbance resulting in the deposition of tuff and breccia.

(2) Second period of igneous activity resulting in the incipient fissuring of the limestone and probable intrusion of porphyry.

(3) Deposition of ore from ascending solutions.

(4) Period of oxidation, with formation of caves by descending waters.

(5) Calcification of the caves, sealing up the oxidized ores in their walls.

The miners recognize two classes of ore deposits—the *manta* or blanket form, and the *abra* or fissure partially filled with mineral; they belong, however, to the same system. The small fractures and fissures in the limestone, enlarged by circulating waters, formed the *abras,* while the *mantas* are limited to the more soluble beds, or, we might say, certain favorable strata, where replacement of the limestone by ore extended to a considerable distance from the fissures.

From an examination of the smaller cave and watercourse system, I was at first led to the conclusion that the ore was deposited in pre-existing cavities—that is to say, the caves and watercourses were first formed and afterwards filled with mineral. After seeing the extensive *manta* in the Tres Mercedes mine, it became clear that here, at least, it was a simple case of replacement between limestone and the sulphides, while a more extensive examination of the great caves confirmed me in the conclusion that they were formed after the original ores were deposited.

It appears to me that the ores were deposited from ascending solutions which found their way upward through the more open parts of the incipient fissures and joint-planes in the limestone, enlarging them and depositing the ores as sulphides. The more soluble beds were acted upon for considerable distances from the fissures (Fig. 1), and the *mantas* formed by metasomatic action. After the close of this period of ore deposition there followed one of oxidation, probably with reversed currents and descending surface waters, oxidizing the sulphides to sulphates, oxides, and resulting carbonates, attacking the limestone above and below the *mantas,* forming the great caves (Fig. 2) which to-day are one of the most wonderful features of this very interesting mining district. During this period of oxidation, the ores near the surface were leached, to a great extent, of their lead and silver values, which were reprecipitated at greater depths, thus enriching the "deeps" at the expense of the shallow deposits; furthermore, mechanical enrichment has also played its part in removing, through the large watercourses and fissures, oxidized ores from the caves and fissures near the surface and depositing them in the deeper caverns. Thus we find the shallow caves often empty, or containing only a small floor-deposit of impoverished ore, while the caves at 1,400 ft. are almost filled to the roof with loose deposits of rich argentiferous lead carbonates. At present the deepest mines in the district may be said to have both the largest deposits and the richest ores. It is quite probable that this will be the general experience with deep mining, at least in the larger ore-bodies, due solely to the leaching of the shallow ores and mechanical and chemical enrichment of the deeps, as previously described. With the close of active

*Abstract of a paper entitled "Notes on the Santa Eulalia Mining District, Chihuahua, Mexico,," by Philip Argall. *Proceedings* of the Colorado Scientific Society, August, 1903.

[1]*Transactions* American Institute of Mining Engineers, Nov., 1901, Mexican meeting.

oxidation the interior of the caves became coated with a beautiful crystalline deposit of calcite, probably while they were yet filled with water, and later stalactites and their counterpart were formed, as in the usual limestone cavern.

I had the good fortune to see two newly-opened caves. The sight was one not easily forgotten. On every side the most delicate crystalline growth covered everything in sight, sparkling in the candle light like beautiful objects of cut glass, crackling under our feet as if we were walking on thin ice, while here and there huge stalactites hung jauntily from the roof or joined hands with their fellow stalagmites rising in graceful lines from the floor of the cavern. The eyes of the miners, however, were directed to the blemishes in this indescribably beautiful scene, the discolorations on the walls almost too faint to notice in passing, but indicative, nevertheless, of the mineral wealth hidden from view by a few inches of sparkling incrustation.

A word as to the size of these caves: I am credibly informed that some of them reach a width of 300 ft. I saw one 160 ft. across and about 300 ft. in length. The fissures or joint-planes, along which the ore deposits occur and form the caves, are generally mere films outside the caves, and difficult to follow on their strike. The same remarks often apply to the vertical position, though there is usually a system of open cracks and watercourses connecting a given cave (of a series) with the next one below and above it.

In one mine I went from the surface to a vertical depth of 600 ft. through natural caves and watercourses—the most unique and inspiring experience that I have encountered in a rather varied mining career. The trip completed my visit to the deep mines of the Santa Eulalia district, and, had I been told then that 20,000,000 tons of limestone had been dissolved and removed from the mountain by the silent, yet potent influence of circulating carbonated waters I would not have questioned the statement. Even now, after calm reflection, though lacking data to form more than the crudest estimate, I would not feel like reducing that figure over 50 per cent, assuming that the unexplored portion of the district has a similar mineralization and cave-system.

The facetious names given to some of the caves and stopes are rather suggestive of their size, as, for example, the "battalion stope," in which 200 men were said to have been steadily employed for some years; the "*patio de toros*," and the like. In one mine I visited, a roadway had been constructed from the mouth of a cave in the side of a cañon, down through a series of immense caves and stopes, until finally the working faces were reached at a vertical depth of 300 ft. below surface. At one point in this roadway connection was made from one cave to another 40 ft. below by a spiral roadway shot out of the solid walls of the connecting cave or watercourse—an admirable piece of engineering. By means of this road the mules were brought right up to the working faces, so that the ore could be packed out to the surface on the animals' backs—the acme of cheap underground transportation from a Mexican's point of view.

It may be added that the most disappointing thing to me on arriving at the Santa Eulalia mines was the practical absence of dumps. Not that they are absolutely necessary for profitable mining (they are usually a necessary evil), but one could scarcely conceive that mines had been operated there for a century or more, producing millions of dollars' worth of ore, and only 3,000 or 4,000 tons of waste on the surface dumps. When I asked for an explanation it came quickly—"the ore was very rich, the Mexicans smelted everything they took out of the mines." The real cause is the immense cave system in the mines, providing ample room for stowing all the waste, not only that produced from mining the ore, but also from the development work. Practically the only mine dumps are those recently made under modern management, and it is questionable if it would not have been better mining to have used the waste-rock to fill up old stopes and caves, as the Mexicans formerly did, instead of hoisting it to the surface.

The Santa Eulalia limestone appears to pass readily into solution. All surface exposures show the flints and fossils standing out prominently, while many of the joint-cracks are enlarged and, in places, caves are formed which appear to have no relation to the ore deposits and are, in all probability, of later age. Some of the watercourses connected with the system of ore caves are oval-shaped tubes, devoid of

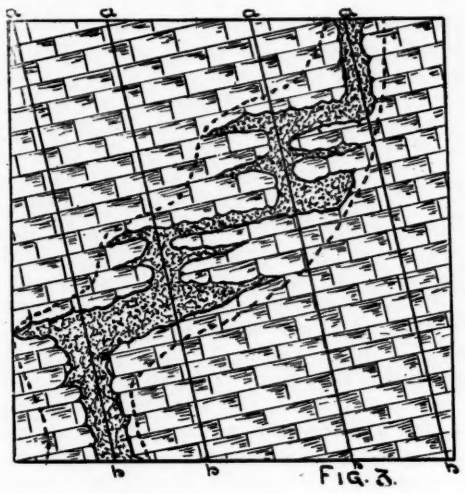


FIG. 3.

OXIDIZED ORE

a, b. JOINT OR FRACTURE PLANES

ore and quite smooth except for the insoluble flints that stand out in serrated layers and an occasional bump of solidified limestone.

Another form of deposit is shown in Fig. 3. When solutions ascending a joint-plane follow suitable strata to the next joint, ascending along it for a distance and then repeating the phenomenon, replacing in each instance the limestone with ore, as outlined, subsequently a cave may be formed as shown by the broken lines. Fig. 4 is a sketch made at a

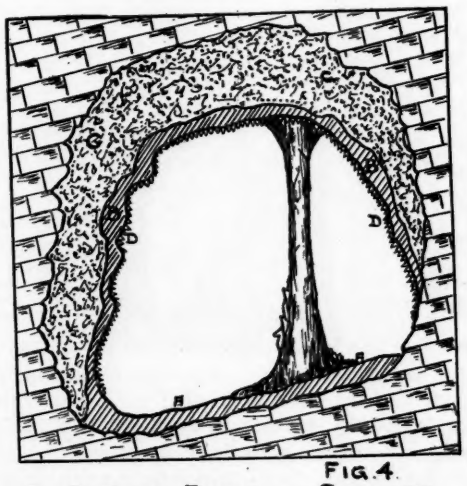


FIG. 4.

A - SMOOTH FLOOR OF CALCITE.

B - CALCITE LINING ON GALENA ORE.

C - GALENA and PYRITES CONTAINING DRUSES FILLED WITH WIRE SILVER.

D - INNER LINING OF CALCITE CRYSTALS.

depth of 1,500 ft. from the surface, where solid mixed sulphides can be seen for the first time in that mine. The pyrite and galena appear to be secondary, these ores having been deposited on eroded limestone in what was apparently a watercourse, adjoining and connected with a large cave of oxidized ore. The galena was quite fresh and apparently unaltered; the pyrite was in places oxidized to quite a considerable extent, but the greater part of it appeared to be unaltered. Some native silver occurs in the druses of the mixed sulphides, and the superintendent informed me that he found a loose deposit of native silver on the floor of the watercourse behind the stalagmite shown in the sketch. The mixed sulphides, he told me, assayed about 59 per cent lead and 80 oz. of silver per ton.

An interesting speculation on the Santa Eulalia deposits is: To what depth will the zone of oxidation extend? and, furthermore: Will the first zone of solid sulphides be enriched by secondary agencies?

These are difficult questions, but, reasoning from analogy, I am inclined to the opinion that the latter will be moderately enriched for a shallow depth—I might almost call it superficial enrichment. It must be remembered that the oxidized ores are simply chemical concentrations from the original sulphides, and that the beds of cerussite and bunches of chlorides and bromides of silver contained in the mass of the oxidized ore should account for the greater part, if not all, of the values leached from the original sulphides; consequently, one could not, I think, reasonably expect a zone of heavy sulphide enrichment, nor could even a moderate sulphide enrichment be expected to extend to any great depth in the original sulphides. The depth to which oxidation will reach must naturally vary with the size of the ore bodies. The larger deposits, I take it, should extend in a partially oxidized condition for a considerable distance below the water level of the district. The water level may not be an easy matter to determine. The mines are practically dry at a depth of 1,450 ft., as measured at the Santo Domingo shaft, and considering the arid nature of the country, it is doubtful if any material amount of flowing water will be encountered. The mines may have, in fact, already reached the ground-water level, as a small quantity is being met with. Furthermore, there are strong indications at a depth of 1,500 ft. that the sulphide zone appears to be near at hand. The original sulphide ores, to be found below the zone of oxidation, will, in all probability, be of much lower grade than the oxidized ores, as well as more difficult to treat.

THE AMERICAN TASTE FOR DIAMONDS.—A good illustration of the American desire for diamonds is shown by the large increase in importations. In the seven months ending July 31 the imports into the United States were valued at $7,426,912 in uncut diamonds, and $9,287,643 cut stones, making a total of $16,714,555, which compared with 1902, shows an increase of $4,559,595, or over 37 per cent. This growth was chiefly in uncut diamonds from Europe. It is worthy of note that the imports of diamonds constituted 86.5 per cent of the total receipts of all kinds of precious stones.

BRITISH COAL TRADE.

Export demand has been good this year, particularly from the United States, Germany and Italy. In the seven months ending July 31 the exports from Great Britain were as below, in long tons:

	1902.	1903.	Changes.	
Coal	24,015,675	25,902,856	I.	1,887,181
Coke	343,130	370,673	I.	27,543
Briquettes	639,911	557,772	D.	82,139
Total	24,998,716	26,831,301	I.	1,832,585

In addition to the above there were exported 9,489,288 tons coal for the use of steamers engaged in the foreign trade, against 8,533,457 tons in 1902; showing an increase of 955,831 tons.

The exports of coal to some of the more important countries were as follows:

	1902.	1903.	Changes.	
France	4,043,093	4,021,491	D.	21,602
Germany and Holland	3,590,307	3,797,714	I.	207,407
Italy	3,552,228	3,668,464	I.	116,236
United States	79,521	1,103,093	I.	1,023,572
Other countries	12,750,526	13,312,094	I.	561,568
Total	24,015,675	25,902,856	I.	1,887,181

It is noteworthy that the increase in the exports to the United States is nearly equivalent to the total for all countries.

ROASTING AND FILTER-PRESS TREATMENT AT KALGOORLIE.

By J. T. MARRINER.*

Attention was first directed to the treatment of these sulpho-telluride ores in 1897.† The reserves of oxidized material in some of the mines of the district having become insufficient to maintain an output, laboratory experiments and small battery trials were carried out to ascertain the best methods of treating the unoxidized or telluride ore. It was at first the intention to use, if possible, the existing stamps which had been erected to crush the oxidized ore; but it was found in the majority of cases that less than 20 per cent of the gold was extracted by amalgamation, owing to the extremely fine distribution and refractory state of the gold. For the same reason the methods of concentration and cyanidation then in use also gave unsatisfactory results, with perhaps very few exceptions, and this also entailed the introduction of a different process. As was stated in THE ENGINEERING AND MINING JOURNAL, about five years ago, the author found, in experimenting, that it was inadvisable to crush with the salt water of the district and subsequently roast the tailings, on account of the volatilization of the gold, due to the presence of the chlorides of magnesium and sodium and other chlorides left over from the evaporated water.

The loss by volatilization does not occur to an appreciable extent in muffle-roasting if the temperature is kept at a dull-red heat; but as soon as the temperature increases to a cherry red, white fumes are given off, which condense on a cool surface as a purplish white powder. This loss of gold can be made in some cases, under special conditions, as high as 70 per cent of the total gold contents of the ore.

The Roasting Process.—Laboratory experiments gave extractions of from 80 to 90 per cent by dry crushing, through wire screens of 30 and 35 holes to the linear inch, followed by roasting and leaching in the ordinary way in cyanide vats. Upon these results the first sulphide plants were erected, utilizing the cyanide vats of the old plants, so that dry-crushing mills and roasting plants had to be erected.

The extractions obtained on a large scale, however, did not correspond with the laboratory experiments. The best average extractions probably did not reach 75 per cent. These lower extractions were due to various causes, as follows: Cementing action of the ore in the cyanide vats, some of the ore of this district containing approximately 12 per cent of calcite, which, in the process of roasting, became converted into the oxide and sulphate of lime, with the result that the pulverized ore in the leaching vats became so hard that it was necessary to use picks to break it up when emptying the tank. This setting action was reduced by wetting the ore some hours before charging the vats, but was never entirely eradicated, with the result that the solutions were caused to run in channels through the mass, leaving large unleached portions. The roasting of the ore also at this time was often imperfect and undoubtedly accounted for, to a large extent, many of the indifferent results obtained.

These bad roasts were due to the use of unsuitable furnaces and inexperienced workmen. On each occasion of a bad roast the extraction fell to 40 or 50 per cent, while the consumption of cyanide would increase enormously; in some cases the consumption over long periods was 11 to 12 lbs. per ton. A bad roast also would affect the extraction for some days, until the fouled solutions had been rectified. Finally, in the process of roasting, undoubtedly a large quantity of coarse gold is produced, not necessarily spherical gold, formed by overheating, but of an irregular shape, formed apparently by the welding together of small particles. The rabbles in some furnaces become coated with a plate of gold. If the roast is imperfect this coarse gold, which is seen to be coated with a brownish-red covering, will neither amalgamate nor dissolve in cyanide within a reasonable time.

The general results of the plants erected being thus unsatisfactory, further laboratory trials were made, and these, with the experience already gained, led to the adoption of the following system of treatment: Dry-crushing and roasting were performed as heretofore, but the roasted product was mixed with dilute cyanide solution and separated in V-shaped boxes, the fines going to the agitation vats, while the coarse sands underwent grinding until they were in such a state of subdivision as to free all the gold. It being found in practice that when the pulp passed through a screen with 100 holes to the linear inch, the pulverization was sufficient, therefore, when this fineness is attained, this pulp also is sent to the agitator vats. The resulting slimes were agitated in cyanide having an approximate strength of .03 per cent for 8 to 12 hours, after which time practically the whole of the gold was in solution.

The solution is separated from the pulverized ores by means of filter-presses, and the gold deposited on zinc in the usual way. By this treatment laboratory experiments showed extractions as high as 98 per cent; working on a large scale the average extraction for a year proved to be only 92.2 per cent, using approximately 1.3 lb. of cyanide per ton of ore, which, on ores assaying 16 dwt. per ton of 2,240 lb. were very satisfactory results, the residues being worth 1 dwt. 7 gr.

Had the extraction of, say 87 per cent, as indicated by the experiments on leaching the whole product, been fulfilled, it would have been more profitable than the sliming and filter-pressing of the whole roasted product owing to the greater expense of the latter process.

The Costs of Treatment by this process are difficult to obtain, and are widely divergent; they have been estimated at from less than $5 to as high as $10 per ton of 2,240 lb. The following were the costs at the Great Boulder Main Reef works for 1902, this being the first plant of this kind to be erected and working on the Kalgoorlie field. The capacity of this plant is 2,000 tons per month:

	Shillings.	Pence.	Dollars.
Power (includes condensed water) and air used on filter-pressing plant....	5	9.58	or $1.392
Crushing		9.08	.182
Milling in ball mills.....	2	0.65	.493
Roasting	6	0.18	1.443
Grinding and amalgamating in Wheeler pans	1	3.88	.318
Filter-pressing and agitating.....	2	7.00	.620
Trucking		10.65	.213
Precipitation and clean up.....		8.58	.172
Cyanide—1.13 lb. per ton.....	1	3.94	.319
Water (salt water for plant use).....		9.85	.197
Assays		1.94	.040
General expense and maintenance.....	1	4.12	.322
Total, per ton of 2,240 lb.....	23	9.55	$5.711

The average for the year was considerably higher than that of the last few months; for example, the costs in January were $6.42, compared to $5.32 in October, and $5.14 for the following month.

During the year 1903 ample scope for further reduction of costs has accrued; fresh water is now being supplied at 6 shillings, or $1.44 per 1,000 gallons, compared to 70 shillings, or $16.80 per 1,000 gallons, owing to the recent completion of the Coolgardie water scheme. The high cost of roasting also should be reduced to 2½ shillings, or 60 cents per ton by the introduction of the latest design of furnaces. Fuel at the time quoted consisted wholly of wood at 13½ shillings, or $3.24 per ton, while wages averaged 12½ shillings, or $3 per day. The filter-pressing costs appear high on account of the men on the plant not being fully employed.

The roasting plants of the Kalgoorlie field may be said, therefore, to be modeled as follows:

Gates rock-crushers followed by Griffin or ball mills as dry crushers.

Roasting in Edwards or Merton furnaces.

The Argall furnace has, unfortunately, not been tried on this field, whilst the Ropp and Brown straight-line proved unsatisfactory.

Fine grinding in pans or grit-mills.

Agitating and filter-pressing.

A large portion of the machinery is peculiar to the district, perhaps the most interesting being the introduction of filter-presses to the gold mining industry.

The Filter-Press as used in gold extraction may be described as a machine for leaching under pressure. It was first designed for use in the manufacture of sugar and other chemical processes, and has since been applied to the gold mining industry. Little or no alteration has been made in its design. It consists of a series of 50 frames, 40 in. square and 2 or 3 in. thick. Between each frame is a corrugated plate covered with filter-cloth. Lugs are cast on these frames and plates with core holes so arranged as to allow the passage of solution or pulp to either plate, or to the frame, as is required. When the press is shut, that is, when all the frames and plates are held tightly together in their correct position by means of either a mechanical device of compound levers or a hydraulic ram, the pulp is forced into the press, passing along a channel of core holes into each frame, filling the frame, which is bounded on either side by the corrugated plate covered with filter-cloth. As more pulp is forced in the pressure increases so as to force the solution through the filter-cloth and cause it to pass out of each plate through a small valve at the bottom of one of the sides of each plate, the pulverized are remaining as residue on the filter-cloth. This process continues until the frame is solidly filled with a cake of residue. The next operation consists in washing the gold-bearing solutions out of this cake of residue. To do this, washing solution is pumped along another channel, which is cast in the lugs before mentioned. Core holes pass only from this channel to every alternate plate. The valves on this plate, through which the solution has already passed away on filling the press, are shut, the result being that the solution passes through the filter-cloth on the plate, through the mass of residue to be washed, carrying before it the gold-bearing solution into the plate on the other side of the frame, running out (as may be desired) at low pressure into suitable launders.

After the washing operation is completed the cakes of residue contain about 35 per cent of moisture, the exact quantity depending on the nature of the ore. It is advisable to force out as much of this water as possible for convenience of emptying and to save the small amount of gold which it may contain. Therefore, when the washing is completed, compressed air is turned into the same channel, thereby displacing further 10 or 15 per cent of the moisture. The press is now ready for emptying.

The process of emptying consists in releasing the great pressure on the frames and plates, and pulling each frame and plate along the horizontal bars on which they rest, carefully cleaning the joints on each side of the frame and plate, the surface of the filter-cloth, and knocking out of the frames the cake of compressed pulverized ore.

The cake of residue, so knocked out, falls either into trucks or onto a conveyor or belt to be deposited on a waste dump.

The above may be taken as a general explanation of the method of using a filter-press, but it by no means describes the variations which are adopted.

The capacity of the filter-press depends upon the nature and value of the ore. Taking a press containing 50 frames of the size above described, the capacity of the press on the Kalgoorlie gold-field varies between 3.75 and 4.5 tons of 2,240 lb.

The time taken to fill the press.....	½ hour
The time taken to wash with solution and water to make up loss.....	2 hours
The time taken to dry, clean, and close.....	1 hour
Total	3½ hours

or approximately 7 charges per day of 24 hours per press, equivalent to 25 or 30 tons. The men em-

*Late manager of the Great Boulder Main Reef mine.

†Full analyses of the water and the ores at Kalgoorlie will be found in previous papers appearing in this JOURNAL, in the *Transactions* of the American Institute of Mining Engineers (paper by T. A. Rickard) and in the *Proceedings* of the Institution of Mining and Metallurgy (paper by Alfred James), so that further repetition is deemed unnecessary.

ployed work in pairs, one on either side of the press, cleaning each frame and plate simultaneously.

Each pair of men can clean from 6 to 8 presses per day, provided there is always a machine ready to discharge.

When presses were first utilized they were filled by means of montejus, that is, a vertical steel tank 12 or 15 ft. high by 5 or 6 ft. in diameter, which is filled with the pulp to be filter-pressed. Compressed air up to 80 lbs. pressure is turned into this receiver, so forcing the pulp into the presses at fairly uniform pressure. It is found by experience, however, that the amount of air consumed is too excessive and an almost equally steady pressure can be obtained by using three throw plunger pumps fitted with large air-receivers on the delivery pipes, care being taken in the manufacture of the pumps to have the valves and fittings of cast iron, all brass or gun-metal being quickly dissolved by the cyanide.

When the solutions pass away from the filter-press they contain a quantity of fine slime which has passed through the cloth and through small holes in the cloth. It is advisable to pass this solution through another specially designed clarifying press, so as to prevent the deposition of a quantity of worthless slime in the zinc boxes.

Costs. The chief items in the costs of filter-pressing are:

(1) Labor.

(2) Power in filling and washing.

(3) Wear and tear of filter-cloths and general repairs to valves which cut through, owing to the rush of pulp against the faces of the valves. Also the continual repairing of the small valves on each of the plates.

The filter-cloth used is equal to 1 yard per 5 tons, or about 10 cents per ton; this, I am assured, is exceptional, and is due to the cloth becoming coated with calcium salts, so as to stop free percolation and render the cloth useless before it is actually worn out.

The costs on the Boulder Main Reef plant for last October, the plant at this time being fully employed, were as follows:

	Shillings.	Pence.
Labor, attending agitators, solution hands, and cleaners	1	6 or 36 cents per ton
Filter-cloth		5 or 10 " " "
Repairs		2 or 4 " " "
Total	2	1 or 50 cents per ton

This figure does not include the power used in filling, which it will be seen is given under a general heading of Power, nor does it include the cost of removing the residues.

The filter-press as now supplied by the makers is little different to the original press used for other works; undoubtedly more suitable machinery will be introduced. The introduction of more suitable valves and taps and the general use of the hydraulic ram for giving the final pressure in closing the press, also an increase in the size of the channels into the frames and plates, would all expedite washing and filling.

So long as it is necessary to open the press after each charge a large expense in labor and filter-cloths will be incurred.

Great progress would be made if it were possible to empty the press by means of sluicing the cakes out with jets of water or some equally cheap means.

Other economies may perhaps be made by increasing the thickness of the cake, so diminishing the number of cakes and therefore the number of filter-cloths and faces to be cleaned.

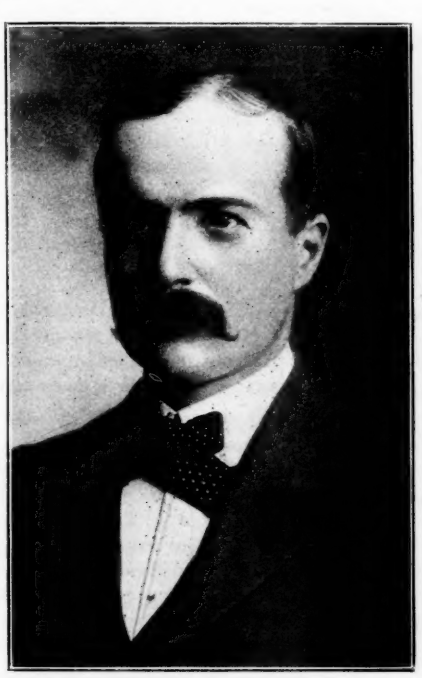
Experiments carried out have proved that with roasted ore a thickness of cake up to 18 in. can be washed rapidly with a pressure of 60 lb. per square inch with very satisfactory results, but owing to the present design of the machinery such cakes would be difficult to handle. On the other hand, with unroasted ore the thickness of cake should not exceed 2 in., otherwise the pressure used in washing would be abnormally high.

Methods of Application of the Filter-Press.—There are two chief methods for applying the filter-press to extracting gold from slimes of fine sands. The first method was more in vogue when presses were first used. The pulverized ore or lumps of slime from old slime dumps were mixed with cyanide solution in the proportion of about one and one-half and forced through the cakes to dissolve the gold; sometimes the wash would be stopped and compressed air forced through the cakes for 5 or 10 minutes and the cyanide solution again forced through. The first solution coming off after the passing of the compressed air showed its very beneficial effects on the extraction. The washing in this case requires as much as from 5 to 8 hours to dissolve the gold in the press. This loss of time naturally suggested the idea of dissolving the gold before forcing the pulp into the press.

The second process now consists in mixing the pulp in the cyanide solution, with subsequent agitation in vats, 15 to 20 ft. in diameter and 7 to 10 ft. deep. When practically the whole of the gold is dissolved, as previously explained, the pulp is forced into the presses, whose duty it is to simply separate the gold-bearing solution from the worthless residue.

THE NEW PRESIDENT OF THE LAKE SUPERIOR MINING INSTITUTE.

Mr. George H. Abeel, the newly-elected president of the Lake Superior Mining Institute, comes of an old New York Dutch family, his father and his grandfather having been in the iron business in that city for many years. He was born in New York



GEORGE H. ABEEL.

in 1862 and graduated from the Columbia University School of Mines in 1883. Soon after graduation he went to Negaunee, Mich., in the employ of the Iron Cliffs Company, of which his grandfather was then president.

At that time the Iron Cliffs Company, now a part of the Cleveland Cliffs Company, operated the old Pioneer iron blast furnace at Negaunee, since dismantled and replaced by the Pioneer Furnace No. 2, at Marquette. It was, in 1883, producing 18 tons of pig iron a day, the blast being furnished by a pair of horizontal geared blowing engines which were so speeded as never to give a blast pressure of greater than 1½ lb. to the sq. in., this being assumed as the maximum for good practice. After almost a year's importuning Mr. Abeel induced the management to permit him to run the blowing engines by revolutions as was being done in the East, instead of by direct pressure. To the surprise of the manager, the product was increased, and Mr. Abeel had the satisfaction of seeing the furnace at the end of six months produce 40 tons a day, which was found to be the limit with the old blowing engines. On a visit East he induced the directors to consent to the purchase of a new blowing engine, and in less than six months more the product was raised to 80 tons per day, or an increase of 344 per cent above the old practice.

This experience is particularly interesting on account of the paper, on the "Charcoal Industry of Northern Michigan," read at the recent meeting of the Institute by Mr. William G. Mather, in which reference was made to the old Pioneer Furnace.

In 1886 Mr. Abeel moved to the then new Gogebic iron range, to take charge of the Ironton mine, and shortly afterwards of the property of the Montreal Mining Company at Hurley, Wis., of which he has been manager for 17 years. Mr. Abeel was one of the organizers of the Institute, has been its treasurer many years, and his election as president is a fitting reward for his untiring services in its interests.

IRON AND STEEL EXPORTS AND IMPORTS.

There has been an improvement in the exports of iron and steel—including machinery—from the United States in July, the trade being valued by the Bureau of Statistics of the Treasury Department at $9,021,668, which compares with $7,931,912 for the same month last year. In the seven months ending July 31 the total value of these exports was $57,103,491, against $57,263,304 in the corresponding period of 1902, showing a decrease of only $159,813. The more important items of these exports were as follows, in long tons:

	1902.	1903.	Changes.
Pig iron	19,672	9,196	D. 10,476
Billets and ingots	1,330	805	D. 525
Bars	32,413	41,254	I. 8,841
Sheets and plates	12,826	10,232	D. 2,594
Rails	54,644	4,897	D. 49,747
Structural steel	38,944	19,145	D. 19,799
Wire	59,694	62,551	I. 2,857
Nails	20,559	24,455	I. 3,896

The increases were in articles shipped principally to far Eastern markets and to certain European countries where the trade has long been established.

The exports of iron ore in the seven months were 10,624 long tons, which is less than half the quantity reported in 1902 and 1901.

The imports of all classes of iron and steel in July were valued at $3,529,676, which is $632,507 less than a year ago. In the seven months ending July 31 the total imports were $28,849,425, as against $19,333,446 in 1902; showing an increase of $9,515,979, or 49.2 per cent this year. The chief items of these imports were, in long tons:

	1902.	1903.	Changes.
Pig iron	177,763	490,497	I. 312,734
Scrap iron and steel	48,650	66,475	I. 17,825
Ingots, billets and blooms	123,222	209,300	I. 86,078
Tinplates	39,669	30,656	D. 9,013

The heavy consumption of iron and steel in this country is responsible for the increased imports from Great Britain, Germany and Belgium, particularly of pig iron and steel billets. The decrease in imports of tin plates is explained by the growth in the American tinplate industry, which is not only meeting much of the domestic demand, but is also able to cater to export markets.

Imports of iron ore, chiefly from Cuba and Spain, in the seven months were 569,855 tons, as against 682,490 tons last year, showing a decrease of 112,635 tons, or 16.5 per cent in 1903.

MONAZITE EXPORTS FROM BRAZIL.—In 1902 the exports of monazite sand, valued for its thoria content, from Bahia, amounted to 13,520 bags (811 tons), valued at £16,223, which is considerably less than 1901. One firm has a monopoly of the industry in the Prado district, and ships principally to Germany. Attempts to develop other new sand-bearing districts have been unsuccessful, owing to the small percentage of thoria.

THE DIAMOND DISTRICT OF THE VAAL RIVER.

By T. LANE CARTER.

It was not Kimberley that caused the first rush of diamond-seekers to South Africa, but that part of the country along the Vaal river known as the "river diggings." One understands why this region attracted prospectors, for in other parts of the world diamonds had been found in debris of a similar kind, while the occurrence of these gems in volcanic pipes was unknown.

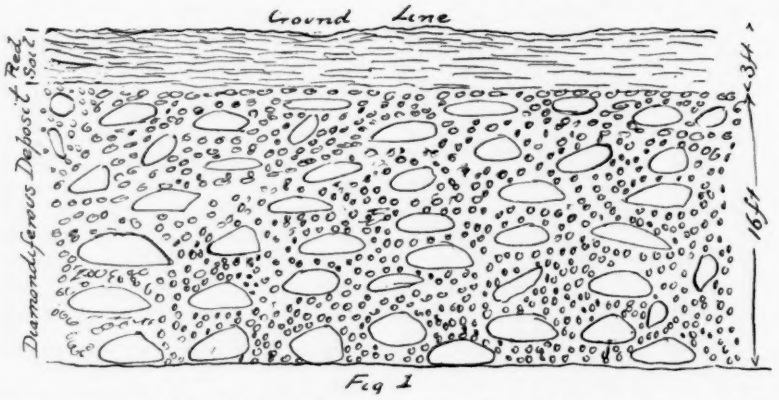


Fig 1

The present aspect of the diamond mining industry in this district is different from the past. At one time there were as many as 10,000 men at work along the Vaal. Now, there are not a thousand.

Geologically, the district is interesting. The whole country for miles has been turned over in search for diamonds, so that it is possible to get frequent cross-sections of the deposit. The diamantiferous material is a bed from 5 in. to 20 in. thick, a mass of gravel and sand, thickly studded with boulders of basalt and melaphyre. A section taken on the east bank of the Vaal is shown in Fig. 1 and in the photograph marked A.

Heretofore the deposit has been worked in the crudest way. It has been a "poor man's field," that is, a man did not require a big outlay to begin the search for diamonds. After staking out a claim 30 ft. by 60 ft., the digger commenced work. The past record of the district shows that it has proved one of the biggest of gambles. In a few tons of stuff a miner has found enough diamonds to make him a wealthy man, while his neighbors have starved to death. The excitement of the work, and the chance of making a fortune in one lump, keeps men digging at the present time, picking over old heaps, and finishing abandoned claims.

Of late there has been a tendency to form companies, to work the material on a large scale, and more scientifically, than in the past. The same methods are now used by the individual diggers that were in vogue in the early days. It is generally possible to get out the material with the pick and shovel, blasting being required only occasionally. The large boulders are thrown out, the finer stuff being loaded into a "baby," a rocking sieve arrangement, which separates the fine material from the coarse. The coarse stuff is discarded, while the fine stuff is piled up and subsequently put through a small-hand-washing machine. The concentrates from this machine are picked over by hand, the method of catching the diamonds by grease, as at De Beers, being nowhere in use.

As already pointed out, the occurrence of the diamonds is very erratic. A man sometimes goes on working with his gang of Kaffirs for days without finding anything. It is considered a good sign if garnets and peridotes abound. In spite of the irregularity in pay, the Kaffirs appear to like the district, possibly on account of the free life, and the chance of getting drunk frequently.

In the heart of the district there is a genuine volcanic pipe similar to the mines at Kimberley. This pipe might account for the occurrence of diamonds in the surrounding gravel deposit, for it is worked as an open-cut mine, by two separate companies. The larger of the two, the Elands Drift Diamond Mining Co., employs at present about 30 whites, and 250 Kaffirs. Being so far out the wages are a little better than in the big centers. On a dark night the lights of Kimberley are easily distinguished, about 24 miles distant.

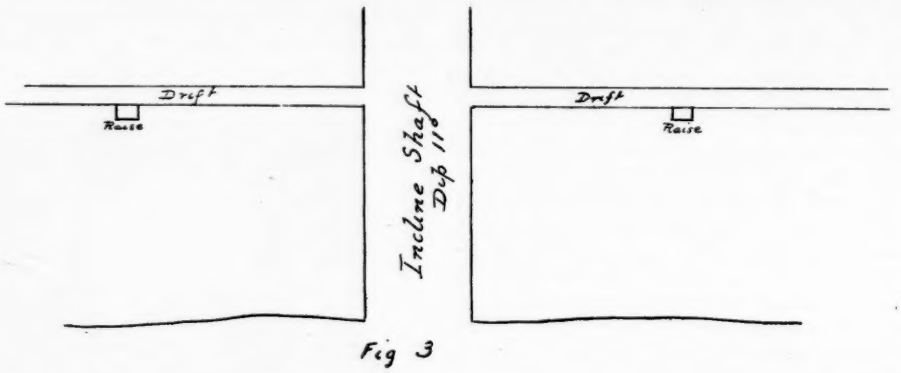


Fig 3

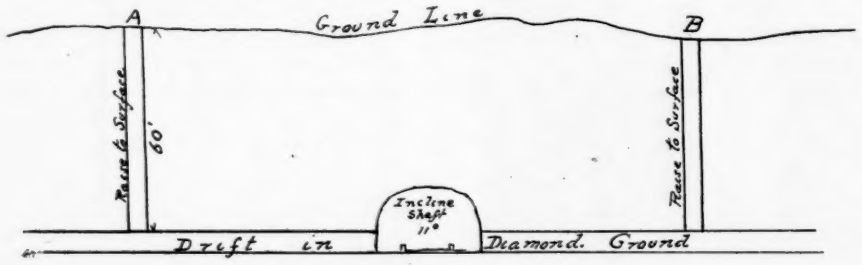


Fig 2

The Elands Drift Co. is not a great producer; like the diamonds found in the gravel deposits, however, the stones found in this mine are of the best quality, worth over $25 per carat. They are characteristic, and an observer would never mistake one for a Kimberley diamond. The gems are peculiarly laminated, and of pure white quality, with few blemishes; the majority of the stones are very small; from 4 to 8 carats gives the range of the larger diamonds.

Being about 12 miles from the railroad, all supplies have to be carried over heavy roads, and this cartage by ox wagon adds consderably to the initial cost of material. For instance, coal costs $20 per ton delivered. It is found more economical to burn wood, obtained from the district along the Vaal river and the country to the north. On account of the high cost of wood and coal, experiments have been made with oil engines, run with kerosene oil, for pumping, etc. About 8,000 gallons of water are produced per hour; the water, being slightly alkaline, is easy to handle.

So far all the mining is done through an open-cut about 200 ft. deep. Mining through a shaft, in the outside country rock, will be delayed as long as possible, on account of the expense; already, however, the caving of the sides is causing trouble, and it is only a question of time when surface mining will cease.

In this mine there is a layer of limestone 5 ft. to 6 ft. thick, then yellow ground, then blue ground; it is the same sequence as at Kimberley. The presence of diamonds in the limestone seems to prove that it was deposited by infiltration from the bottom, after the formation of the diamonds. The volcanic pipe which this mine covers is very large. The material seems somewhat patchy, and broken up by dikes and barren material; the "blue" resembles that found in the mines of De Beers Consolidated, but it is easy to distinguish the one from the other. Very large boulders are sometimes encountered in the blue ground.

The methods of working are very like those in use at Kimberley. All the drilling is done by hand, two Kaffir drillers working together on a long 7-ft. drill, sharpened at both ends. With this long drill the two Kaffirs "jump" the hole. The piece-work system is used throughout with the Kaffir workmen, and it answers very well.

The photograph and Figs. 2, 3 and 4 will give an idea of how an open-cut diamond mine is developed.

As mentioned before, the number of diamonds per 100 loads is small; there is more debris in the deposit than occurs in the Kimberley mines. As yet there are no depositing floors for the "blue," where the stuff is allowed to weather for a year before treatment. It is carried direct to the washing plant for, at the present depth (200 ft.) it is rather soft, and pulverizes easily. All "hard blue" is picked out by hand, and thrown to one side. The workable "blue" is put through heavy rolls before going to the washing pans, of which there are seven at work.

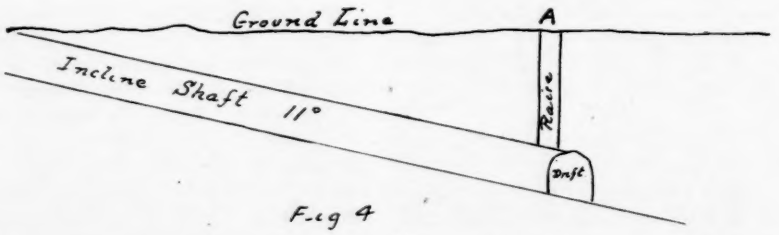


Fig 4

The old-fashioned practice of sorting the concen-

trates from the pans by hand, to find the diamonds, is employed; at Kimberley this practice has ceased, the diamonds being caught by grease spread on a moving table. These grease machines are cheaper and more reliable than hand-picking.

The final concentrates, from which the diamonds are sorted, looks a good deal like the same material from the De Beers Consolidated mines, but there is a greater variety of colored stones, serpentine, olivine, etc.

DIAMOND MINE WORKINGS.

The natives are compounded, as at Kimberley; the discipline, however, is less severe. The company runs a store from which the Kaffirs buy their supplies. The Kaffir wages are about the same as at Kimberley, about $5 per week.

This company in no way clashes with the De Beers' interests, as the output is very small. The diamonds

VAAL RIVER MINE.

are taken into Kimberley about every fortnight, and sold to the Diamond Syndicate. On account of the high price obtained for the stones, the mine is fairly successful, but it is undoubtedly a low-grade proposition, and the position of the company would be better were it possible to work this huge crater of low grade stuff on a very big scale.

Griqua Land West, the district in Cape Colony in which this mine is located, is a most lonely forsaken section, bleak and bare. Agriculture is out of the question because most of the ground has been turned over by diamond hunters during the last thirty years, and there is no soil or subsoil on top of the limestone capping. In its favor, it may be stated that Griqua Land West is reckoned one of the healthiest parts of South Africa.

Figures 2, 3 and 4 are rough sketches to show the method employed in commencing an "open cut" diamond mine. Figs. 2 and 4 are cross-sections, while Fig. 3 is a plan view. The ground is stoped back from A and B, dropped down the vertical raise, trammed along the drift to the endless chain haulage in the incline shaft, and pulled up to the washing plant. In Fig. 4, very little stoping will be done to the left of A, on account of protecting the incline. Sometimes this incline is left entirely open, while at others the superincumbent material is left in place, and the incline timbered to prevent caving.

A HALF-YEAR'S BRIMSTONE TRADE.

By Charles C. Schnatterbeck.

In reviewing the brimstone trade for the six months ending June 30, 1903, it is opportune to make a few remarks on the factors that will likely influence the renewal of the agreement between the Anglo-Sicilian Sulphur Company and the miners in Sicily two years and a half hence. This syndicate was formed in 1896, after a long period of depression in the industry, and its primary object was to control the output for five years by paying the miners a fixed price f. o. b. seaport. Subsequently the agreement was renewed for another term of five years, and to-day the company controls fully 85 per cent. of the production, which is practically a monopoly, as Sicily supplies the bulk of the world's consumption of crude brimstone. This has naturally induced the syndicate to establish a policy of high prices, which, unfortunately, has had a retroactive effect on the trade by encouraging the consumption of pyrites and other sulphide ores that yield sulphur at considerably less than the cost of crude brimstone. The United States, which is the largest consumer of sulphur in the world, is a good example of the result of high prices for brimstone. As was shown in a previous article by the writer, the consumption of pyrites sulphur in this country since the organization of the Anglo-Sicilian Company in 1896 has increased 138 per cent, while the imports of brimstone have grown only about 22 per cent. This transition in favor of pyrites is explained by the increased manufacture of sulphuric acid for the fertilizer trade and for refining petroleum. Incidentally it may be said that the bulk of the brimstone imported is best unmixed seconds, a grade which is consumed mostly by the sulphite paper mills. Here reference should be made to the fact that recently three of the largest pulp manufacturers in Germany and Norway, who formerly used brimstone exclusively, have changed their plants to burn pyrites at a cost, it is estimated, of about £6,000 ($30,000). Maybe Americans will do likewise should the results be satisfactory; at least the difference in the cost of sulphur from pyrites and that of crude brimstone, large as it is, would warrant consideration of the matter.

Looking at the situation from another standpoint—that of production—high prices have necessarily greatly increased the output of brimstone in Sicily, even at a larger ratio than exports, and resulted in a heavy accumulation of stocks. To carry these stocks, which in the past half-year were among the largest on record, it has proved expedient for the company to materially increase its reserve fund. On July 31, 1902, the company held £57,029 ($285,145) for any eventual depreciation in the value of sulphur in stock; this was equivalent to 46.7 per cent of the total reserve. The paid-in capital stock on the same date was £1,035,000 ($5,175,000), which is £35,000 ($175,000) more than was originally issued. Good dividends have been paid to date.

The production of brimstone in Sicily has been variable, and in the absence of any authentic calculations it becomes necessary to base an estimate on stocks and exports. In this way it is shown that during the half-year ended June 30, 1903, the output amounted to about 325,000 long tons, or nearly 40 per cent larger than for the corresponding six months in 1902. Were it not for the labor troubles at the mines during the past few months the production this year would be a good deal more than the 496,300 tons reported in 1902. As it is, however, there will probably be no increase, or, if there is, it will be small, unless the miners adjust their differences soon. Exports, on the other hand, need not be curtailed from this cause, as the stocks on hand at the seaports on June 30, amounting to 287,878 tons, seem sufficient; in fact, they are nearly equal to the total exports for the half-year. Besides, there must be at least 150,000 tons at the mines awaiting shipment. It is worthy of note that the stocks at seaports in the past half-year have been phenomenally large, and on February 1 broke the record at 346,198 tons, a quantity that could meet nine months' export demand. An encouraging feature of the industry is the gradual change from the old way of fusing the sulphur ore and the substitution of methods that improve the quality and increase the yield of best unmixed seconds. This change affects the output and raises the price of best thirds; it also brings to market a lower grade, called "current thirds," which sold at from 6d. to 1s. 3d. per ton below best thirds. Recently a demand has sprung up for ground best unmixed seconds, which bring 5s. 6d. to 5s. 9d. per ton more than the crude product.

Exports from Sicily in the half-year ended June 30 amounted to 273,794 long tons, which compared with the corresponding period last year, shows an increase of 17,531 tons, or about 7 per cent. This increase has been attained in vine-growing countries that consume principally refined sulphur. The distribution of exports was as follows:

Destination.	1902.	1903.	Changes.
Austria	9,315	10,126	I. 811
Belgium	4,956	7,582	I. 2,626
France	30,554	36,756	I. 6,202
Germany and Holland	14,205	16,578	I. 2,373
Greece and Turkey	20,170	21,380	I. 1,210
Italy	37,338	35,325	D. 2,013
Portugal	10,582	13,814	I. 2,232
Russia	9,245	8,241	D. 1,004
Sweden, Norway and Denmark	13,522	15,709	I. 2,187
United Kingdom	13,734	9,905	D. 3,829
United States	83,514	79,837	D. 3,677
Other countries	9,128	18,541	I. 9,413
Total	256,263	273,794	I. 17,531

The shipments to the United States, as will be seen, have fallen off 3,677 tons, and to Great Britain, 3,829 tons, as a result of the increased consumption of pyrites sulphur.

How profitable prices have been this year may be judged from the following table of averages for the six months, which shows increases in every grade excepting best unmixed seconds. Prices are per ton of 2,240 lbs., f. o. b. Sicily:

	1902.	1903.	Changes.
Best seconds, bulk	$20.13	$19.83	D. $0.30
Best thirds, bulk	17.48	18.93	I. 1.45
Refined block, bulk	20.56	20.84	I. .28
Refined roll, casks	22.78	23.43	I. .65
Sublimed flowers, pure, bags	24.46	25.42	I. .96
Sublimed flowers, current, bags.	22.52	23.44	I. .92

The heavy advance in best thirds is explained by the scarcity of supplies consequent upon the introduction of improved methods of fusing the ore.

An advantage to the export trade this year is the continued low ocean freight rates to the leading consuming markets. Those to the United States averaged from 7s. to 8s. 6d. ($1.68@$2.04) to Atlantic ports, and 27s. to 31s. ($6.48@$7.44) by sailing vessels from Antwerp, Belgium, to San Francisco. Very little brimstone is shipped from Sicily to San Francisco, because of the high ocean freight and because Japanese sulphur can be imported at better terms.

In conclusion, thought should be given to the increasing production of sulphur and pyrites in the United States, the possibilities of a large supply from Mexico, where Americans have purchased deposits of sulphur, and to the attempts now being made to introduce British Columbia pyrites in the American market. Imports of large quantities of Spanish and Newfoundland pyrites are being made, and the Americans who are interested in this branch of trade are making long-time contracts to assure stable market prices.

SCIENCE IN COMMON LIFE.*

Our present-day political and economic systems often foster methods by which science and scientific discovery are degraded or robbed of their true value, while the scientific worker is often defrauded of that reward that should come from sturdy effort of mind and hand. It has truly been said that "crafty men condemn studies, simple men admire them, wise men use them." The founding by Besant of what might be called "the authors' mutual protection society" marked an epoch in the history of English literature. No such organization has yet been evolved to foster and protect scientific discovery. The attempt has been made in some scientific circles to divorce the discoverer from the fruits of his labors, under the special plea that it is unprofessional to be associated with these in trade relations. Yet were he allowed or enabled to guide their progress, he would often place them before mankind on a more generous footing than when they are left to be exploited by some crafty, unscientific dealer. But to put the whole question on a much higher plane than that of mere financial well-being, I venture to say that since science stands for accuracy, probity, clear statement of fact, unveiling of error of every kind—whether intentional or unintentional—it can have no sympathy with the deceit and chicanery that are so rampant around us, and that threaten at times even to swamp the high ideals of our universities. Toward the close of his valuable work on "The Rise of the Swiss Republic," McCracken says: "It has become somewhat of a commonplace assertion that politics in the United States have reached the lowest stage to which they may safely go. There seems to be no longer any necessity to prove this proposition, for the general conviction has gone abroad, amply justified by the whole course of history, that no democracy can hope to withstand the corrupting influences now at work in our midst, unless certain radical reforms are carried to a successful conclusion. Our calm American complacency seems, at length, to have received a shock; our habitual optimism to have given place to a feeling of apprehension, lest the malignant forces now uppermost in our national life may not, after all, prove too strong for us; and a corresponding desire is being manifested to set in motion other benign forces which shall save the state from destruction while there is yet time."

Unfortunately all attempts to probe the fundamental first causes of our corruption are checked at the outset by the difficulty of bringing the popular will to bear upon public questions. Our whole administration system, and all the methods by which the people are supposed to make known their desires, are perverted and diseased, so that the sovereign body are prevented by mere tricksters from exerting their legitimate control over the making of the laws which are to govern them. We are suffering not only from deep-seated economic and social diseases, of which perhaps the most alarming symptom is the concentration of wealth into the hands of a few, but from the rule of the boss, and from the lamentable fact that the people at large are divorced from legislation. As a matter of fact nothing stands between us and the tyranny of municipal, state and federal bosses, as unscrupulous as any feudal lordlings in the thirteenth century, except public opinion, imperfectly expressed by the press.

ZINC WHITE *VS.* WHITE LEAD.—T. L. Breton in *Comptes Rendus,* June 15, 1903, states that he has satisfactorily demonstrated that fresh paints containing lead give off plumbiferrous fumes which may have serious effect on the health of persons breathing them. He expresses the opinion that from the hygienic viewpoint, zinc paints should in all possible cases be substituted for lead paints.

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*Abstract from address by Prof. J. M. Macfarlane, June 18, 1903, at the University of Pennsylvania.

NOTES ON ROOFS AND ROOF COVERINGS.

There is a great variety of roofing material, but for mining and metallurgical works it is necessary to obtain a roof which will be reasonably cheap and at the same time fairly durable. The element of first cost excludes roofing with slate and the more expensive metals, which for general architectural work are doubtless the best; moreover, the acid fumes given off in many metallurgical works would be very destructive to certain metals, such as sheet zinc and copper. With these limitations, the question of roofing is often a serious problem, unless it be possible to design the buildings so that the roofs will have such a slight pitch as 1:24, commonly called a flat roof, in which case the problem is simplified by putting on a covering of tar and gravel, which makes not only one of the best kinds of roof in respect to durability, low cost of maintenance and safety against fire, but also is one of the cheapest; in fact it is probably the cheapest of first class roofs. The limitation to the use of tar and gravel, however, is the inability to apply it properly to roofs of steep pitch, the tar having a tendency to melt and run off in the hot weather of summer, and unfortunately the exigencies of metallurgical construction demand often a roof of 30° to 45° pitch. It is the most serious question, therefore, to determine what may best be put on such a roof.

It may be assumed that such a roof will be trussed, the trusses bearing the purlins to support the roof sheathing. The roof sheathing may consist of metal nailed directly to the purlins; or it may be some flexible material laid on 1-in. boards, the latter being nailed to the purlins so that they will be parallel with the pitch of the roof, or else nailed to jack rafters which are themselves carried by the purlins; of these two methods, the former is the cheaper; the stiffness of a yellow pine board one inch thick is such that when nailed to purlins spaced 36 in. apart, center to center, the roof will be good for a snow and wind load of 40 lb. per square foot, which is generally assumed in designing in the northern part of the United States.

Roofs prepared in the manner described above may be covered with corrugated iron, usually of No. 22 gauge, laid directly on the purlins. If the purlins be boarded over, the boarding may be covered with corrugated iron of a lighter gauge, say No. 27, or with shingles, or with some kind of so-called ready roofing. The latter material is usually a woolen felt saturated with coal tar and rolled out in two or three layers, with a layer of coal tar composition between the layers of felt. If the material consists of two layers of felt, it is referred to as 2-ply; if of three layers, it is referred to as 3-ply. Similar ready roofing is made of felt saturated with asphaltum, or with paraffine, or some other analogous water-proof substance.

The ready roofing is put up in rolls of convenient size. In laying on the roof, a roll is unwound parallel with the eaves, and after nailing to the boards another roll is unwound and laid so as to overlap the first by about two inches. The lap is cemented by means of a composition of pitch, and is securely tacked down. After the entire roof is covered, the tack heads at least, and sometimes the whole roof, is coated with composition, which may finally be sprinkled with sand or fine gravel. The sand or gravel greatly increases the durability of the roof. A roof laid with good 3-ply material, the laps well cemented together and tacked down, and the surface covered with coal tar, using about 1.5 gals. per 100 sq. ft., which is about as much as can be made to remain on a roof of steep pitch, and finally thoroughly sanded, makes about as good a roof as is required for ordinary purposes. Its cost should not be more than $2 to $2.50 per square, completed.

A shingle roof is durable, but is somewhat more expensive than a roof covered with prepared felt. At present prices corrugated iron is one of the most expensive of the cheaper roofing materials, and also it is one of the least durable, its first cost being increased by the necessity for repainting the sheets as they are received from the factory, and the cost of maintenance being considerable because of the further paintings that are frequently required if the life of the material is to be preserved at all.

The approximate cost of various roofing per 100 sq. ft. is summarized, as follows:

Boards and tarred felt:	
110 ft. of 1 in. board at $20	$2.20
Carpenters' labor, nails, etc	.50
3-ply ready roofing, in place	2.50
Total	$5.20
Boards and shingles, laid 4 in. to weather:	
110 ft. 1 in. board, at $20	$2.20
900 shingles, at $3 per M	2.70
Roofing paper	.25
Labor, nails, etc	1.91
Total	$7.06
Corrugated iron No. 22 gauge, laid directly on the purlins:	
160 lb. of corrugated iron sheets, at 3c	$4,80
Labor, nails, etc	1.00
Painting 214 sq. ft	1.41
Total	$7.21
Corrugated iron, No. 27 gauge, laid on boards:	
110 ft. of 1 in. board, at $20	$2.20
89 lb. of corrugated iron sheets, at 3.6c	3.20
Roofing paper	.25
Labor, nails, etc	1.50
Painting 214 sq. ft	1.41
Total	$8.56

In the above estimates the price of corrugated iron has been reckoned at 2.4c. per lb. for No. 22 gauge and 3c. per lb. for No. 27 gauge in car-load lots f. o. b. Pittsburg, Pa., or Youngstown, O. It has been reckoned that the under side of the sheets is to be painted with silica-graphite before the sheets are put on, and that the entire upper surface is to be painted with the same. In the case of the corrugated iron laid on boards, and also, in the case of the shingle roof, it is assumed that a sheet of good water-proof paper will be interposed between the boards and the iron or the shingles, respectively. In computing the cost of the boards allowance of 10 per cent is made for waste. It is assumed that the boards will be laid on purlins spaced 36 ins. apart center to center. In the case of the corrugated iron of No. 22 gauge, the purlins may be spaced a little further apart, and there will be a small saving on that account, but this will not be of great significance.

Tar and gravel covering is generally put on a roof of 1-in. boards, laid on rafters, or else on 3-in. plank, grooved and splined (or tongued and grooved), laid directly on the main roof girders. The latter makes the better roof, and is prescribed by the insurance companies for standard mill construction. In that form of construction the roof girders will be heavy beams, spaced something like 8 to 10 ft. apart; if the beams be spaced 10 ft. apart, they should be not less than 8x10 in. for a 16-ft. span. If the spacing be more than 10 ft., which is unusual, a heavier plank than 3-in. is required. A 3-in. plank on 10-ft. span is good for a net load of 40 lb. per sq. ft. within the limit of deflection that can be allowed.

In making a tar and gravel roof, several layers of saturated woolen felt are first put on. The surface of the roof is finally covered with coal tar pitch, and a sufficient body of well screened gravel to give the desired surface. If four layers of felt are put on, the roof is referred to as 4-ply; if five layers, it is referred to as 5-ply.

There are various methods of putting on the felt and pitch. One method for a 5-ply roof is to put on a first layer of heavy dry felt, with 2-in. lap. The other four layers are then put on in courses parallel with the eaves, each layer lapping the one below by 27 in., so that the roof will be five layers in thickness over all its parts. Each layer is well mopped with hot pitch for a distance of 9 in. from the edge. The felt is secured to the roof by 3-dwt. nails with tin discs, driven in rows 10 ft. apart and 12 in. apart in the rows. The entire surface of felt is finally coated with straight run coal tar pitch

and covered immediately with a sufficient body of well screened gravel.

Another method is to put on three layers of saturated felt, as described above, each layer lapping 24 in.; then cover with pitch and apply one or two layers of felt separately in hot pitch. This makes a very good and durable roof.

A third method, which is the one most commonly employed, at least in the Eastern States, consists in putting on three layers of felt over the whole surface lapping each layer 3 in., and then mopping thoroughly with pitch, using not less than 3 gal. per square. Two more layers are then laid in hot pitch, so that the roof will have five plies of felt over all its parts. The last layer is secured to the roof at the laps by 3-dwt. nails with tin disks spaced 30 ins. apart. The surface of the roof is finally covered with hot pitch, using not less than 8 gal. per square.

In all methods the roof is finished against chimneys, party walls, scuttles, etc., by turning up the felt 4 in. against the wall, and over this laying an 8-in. strip of felt with half its width on the roof. The upper edge of the strip and the several layers of felt are fastened to the wall by laths or battens securely nailed, and the strip of felt is pressed into an angle of the wall and cemented to the roof with hot pitch, the lower edge of the strip being nailed to the roof every 4 or 5 in. Especial care must be taken in fitting around the angles of chimneys and sky-lights.

The felt for a tar and gravel roof should be made of the best woolen rag fiber, and should weigh about 15 lb. per 100 sq. ft. of roof. The felt comes in rolls, containing 108 sq. ft. The coating composition should be straight run coal-tar pitch; it should be the residuum from a distillation at comparatively low temperature, distillation at too high a temperature being liable to drive off some of the valuable constituents. The pitch will weigh about 10½ lb. per gal., and not less than 11 gal. should be used. The gravel should be clean and free from loam, and should be as dry as possible. If the roof is laid in cold weather the gravel must be applied hot. The gravel is used in size varying from that of a pea to about ½-in. diameter. Sufficient gravel is required to cover the roof thoroughly, about four bushels per square being used generally in laying a good roof. The cost of putting on a first class, 5-ply tar and gravel roof is approximately as follows:

75 lbs. of felt, at 3c.	$2.25
11 gals. pitch, at 11c.	1.21
4 bushels gravel, at 20c.	.80
Nails, tin discs, etc.	.10
Labor	1.00
Total	$5.36

The cost will, of course, vary according to the prices for various materials, especially the felt, which is worth generally 2c. to 2¾c. f. o. b. factory.

Tar and gravel roofs are frequently put on for less cost than $5 per square; even for as little as $3 per square; these cheaper roofs are generally of only 4-ply, however, and the material used is neither first class in quality, nor in sufficient quantity. The felt will be of light weight, and the quantity of pitch employed will not be what it should be.

The putting on of tar and gravel roofing should be entrusted only to experienced roofers. Specifications for such roofs should prescribe the number of layers of felt to be used, its weight per square, and the quantity of pitch and gravel. A good method in cases where a large amount of roofing is to be done is to buy the material directly from the dealers and contract the labor. The builder may then be sure what quality and quantity of material is being used.

The production of precious stones in the United States in 1902 amounted to $318,000 in value, as compared with $289,050 in 1901. The total value of the precious stones imported into this country during 1902 was $25,412,776, which was $550,209 more than that of the previous year.

THE EXTRACTION OF GOLD FROM CYANIDE SLIMES BY A WET METHOD.*

By JOHN FLEMING.

The process hereunder sketched out, in my opinion, is capable of exceedingly good and effective application, and I am sorry that I have not a fuller and more complete investigation to set before you, instead of only the result of two rather tentative experiments, deficient in many ways, carried out with insufficient apparatus and among the bustle and hurry of a mine department. In what follows there is one point especially upon which the experiments are not final, and that is the cost of the reagents employed, because my object was primarily to recover (if possible) all the gold, and the proper and economical use of the reagents, was to be left for future experience with the process.

EXPERIMENT NO. 1.

14¼ lbs. of roasted slimes of low grade (with much zinc), being sampled as carefully as possible, assayed:

1,046.74 ozs. per ton gold.
39.92 ozs. per ton silver.

The slimes were treated in a tub with 7 lbs. sulphuric acid and 38 lbs. water for 2 hours, and then 105 lbs. of warm water added and left for 24 hours.

The clear supernatant liquor was then drawn off with the exception of 15 lbs. or 20 lbs.; then 4½ lbs. common salt, 3 lbs. manganese dioxide and 7 lbs. sulphuric acid were added, free nascent chlorine generated, and the charge stirred and left till the following morning; 100 lbs. of water were then added and in three hours a complete settlement had taken place and the chlorine solution was run off into a lower tub; a water wash of 30 lbs. of water was added and in three hours again drawn off into the lower tub, to which 3 lbs. of $FeSO_4$ crystals in solution were added and the gold precipitated.

The charge was on the following two days submitted to the chlorination in the same way as above, with an expenditure for the two washes of 4 lbs. salt, 5¾ lbs. sulphuric acid, and 2½ lbs. manganese dioxide. The water wash from the third chlorine treatment did not show gold by the ferrous sulphate test.

The gold in the lower tub was now in the form of brown mud and it consisted of pure gold, which we were naturally unwilling to drain off too closely, and the question was how best to get it washed and transferred to the crucible. This I know we did not manage well, for I attempted to take up the last of the residue of the gold mud from the tub by cleaning it with some mealie meal and then burning off the mealie meal in an iron pan; but the residue of phosphates of lime gave trouble by sticking to the pan, and we suffered a small loss in this way. The button of gold obtained was very malleable and soft (it was not assayed) and it weighed 6.770 oz.

Now, the residue of the charge remaining in the tub after the chlorine treatment assayed 10.44 ozs. per ton of gold and, presumably, most of the silver in the original charge, and I consider that chlorine had little or no power of dissolving more gold from it, so I neutralized the charge with 3½ oz. of caustic soda and subjected the charge to a solution of potassium cyanide on four separate and succeeding days.

The amount of KCN used was in each case ½ lb., and the washes drawn off were as follows:

	Weight, lbs.	Gold per ton, dwts.	Silver per ton, dwts.	KCy. Per cent.
1 KCy wash	105	60.0	164.5	0. 26
2 "	127	37.7	33.5	0.315
3 "	108	38.5	10.0	0. 35
4 "	111	31.5	5.8	0.375
5 water "	128	21.0	1.0	0. 06

The residue of the charge weighed 13⅛ lbs., and assayed 6.88 ozs. per ton.

An epitome of the experiment might be framed as follows:

Got by—	Lbs.	Dwts.	Gold. ozs.		Silver. ozs.
Chlorination	—	per ton	6.770		nil.
1st KCy wash	105	@ 60.0 =	0.158		0.432
2d " "	127	@ 37.7 =	0.120	Ounces	0.106
3d " "	108	@ 38.5 =	0.104	gold	0.027
4th " "	111	@ 31.5 =	0.087	= 7.306	0.016
5th water "	128	@ 21.0 =	0.067		0.003
Residue left	13⅛	@137.6 =	0.045		—
Total gold accounted for			7.351		0.584

If we take 7.306 oz. as the extraction it is equal to 99.39 per cent of the total gold accounted for, and of the extraction 93 per cent has been got by chlorination, and 7 per cent by cyanide of potassium.

As a check against these figures we have the original assay of the slimes, and I need not point out to you how impossible it is to take a fair sample of slimes over 1,000 oz. per ton, and this is only about one-third or one-fourth of what good slimes assay. However, the assay as we have it is a rough check on our work.

Fourteen and one-quarter pounds of slime at 1046.74 oz. per ton contain 7.458 oz., showing a difference of 0.107 oz. of gold, which might be accounted for to some extent by a small loss occasioned by the attempt to clean out the tub thoroughly with the mealie meal.

There is a good deal which might be said about this experiment, the first upon any scale larger than what an ordinary breaker would contain, but before saying anything I shall describe the apparatus used, and thereafter pass on to the second experiment.

The apparatus was principally a 35 or 40 gal. cask cut through the middle, thus forming two tubs of a capacity each somewhat less than 20 gal., and mounted the one above the other on a temporary platform. Each tub had a row of ⅝ in. auger holes up the front, closed with tapered plugs of common pine wood, and the holes were arranged zig-zag ways. so as to give a difference of level of about 3 ins. from hole to hole. The upper tub was mounted on its platform so as to overhang the lower one by about 6 ins., and when the solutions were being drained off it was canted up carefully by hand. The plug holes were cut very cleanly with a sharp auger, and the liquor went down nicely into the lower tub with little or no dripping; if a drip did come in contact with the iron hoop, it was gilded in the most gorgeous fashion instantly.

EXPERIMENT NO. 2.

I took 451 lbs. of wet slimes as it came from the cyanide house. The slimes carried a great proportion of fine zinc and were low grade. In order to get some idea of how much stuff I had, I dried and calcined the lot. The dried and calcined slime weighed 142 lbs. This was transferred to the acid treatment vat and treated with its own weight of sulphuric acid and 500 lbs. of water for three hours. The action of the acid was intense, and at the end of that time the vat was filled up with about 1½ tons of water, and the mixture settled for 24 hours.

(The drying and calcining was quite unnecessary for this process, and was only undertaken to form some idea of what quantity of material was in hand.)

The acid treatment vat was carefully cleaned out and the contents transferred to the tub mentioned above.

Thirty-two lbs. NaCl, and 21 lbs. MnO_2, were stirred in, and one hour afterwards 50 lbs. sulphuric acid gently added. The temperature registered was 57° C., and the action was energetic, plenty of free chlorine being given off. That same and the following day the charge was subjected to three other chlorination washes, using on each occasion 13½ lbs. salt, 9 lbs. manganese dioxide and 21 lbs. sulphuric acid, and after each treatment with chlorine liquor the tub was filled up with water and, after settlement, was decanted. These solutions were precipitated in the lower tub with an expenditure of 35 lbs. Fe_2So_4 crystals.

The gold was washed, roughly cleaned out, and smelted with a small quantity of borax and bicarbonate of soda, and the yield was 104.5 oz. fine malleable bullion—taken as fine gold, but not assayed —probably about 995 fine.

In order to ascertain if further chlorine treatment

*Abstract from The Journal of the Chemical, Metallurgical and Mining Society of South Africa, April, 1903.

would yield further gold, I subjected the charge to a fifth chlorine wash, using 6¾ lbs. salt, 4½ lbs. manganese dioxide, and 10½ sulphuric acid. This treatment still yielded a little gold, after washing with water and precipitation with ferrous sulphate. As before the tub was carefully scraped out and the gold got was 13.1 oz., estimated to be about 800 fine. This would also have been high class bullion, but for a little accident when tilting up the final wash. The Kaffir assisting gave a slight lurch and a few ounces of the charge was run down, and rather than delay to make a separation the lot was smelted. The button got was about the appearance of battery gold —perhaps a little harder—and was estimated to be 800 fine, equal to about 10.5 oz. fine gold. In all, the gold got by chlorination was about 115 oz. fine gold, and the expenditure of chemicals was 79¼ lbs NaCl, 52½ lbs. MnO_2, 123½ lbs. H_2SO_4, besides 140 lbs. H_2SO_4, for preliminary extraction of zinc, and 35 lbs. F_2SO_4 crystals for precipitation.

The charge was then neutralized with 2 lbs. caustic powder and submitted for nine successive days to the action of nine successive washes containing KCN. These KCN washes took one day each, on account of the slowness of the settlement of the alkaline residue, but the chlorine washes settled very fast and two chlorine washes per day could be managed nicely.

The following were the results of the cyanide washes:

			Weight, in lbs.	Assays. Gold, dwts. per ton.	Assays. Silver, dwts. per ton.	KCN per cent.
1st	KCN	wash.....	388	201.2	704.8	0.090
2d	"	"	327	114.4	241.3	0.305
3d	"	"	330	96.3	115.7	0.275
4th	"	"	370	66.3	46.5	0.440
5th	"	"	365	60.3	45.2	0.400
6th	"	"	375	64.0	23.8	0.390
7th	"	"	335	62.7	6.8	0.360
8th	"	"	370	38.0	8.0	0.390
9th	"	"	370	32.3	5.1	0.390

The metallic contents of these different solutions were as follows:

Lbs.		Assay.		Gold, in dwts.	Lbs.		Assay.		Silver, in dwts.
388	@	201.2	=	39.03	388	@	704.8	=	136.7
327	@	114.4	=	18.70	327	@	241.3	=	39.5
330	@	96.3	=	15.89	330	@	115.7	=	19.1
370	@	66.3	=	12.27	370	@	46.5	=	8.6
365	@	60.3	=	11.00	365	@	45.2	=	8.2
375	@	64.0	=	12.00	375	@	23.8	=	4.5
335	@	62.7	=	10.50	335	@	6.8	=	1.1
370	@	38.0	=	7.03	370	@	8.0	=	1.5
370	@	32.0	=	5.92	370	@	5.1	=	0.9
Total gold (dwts).				132.34	Total silver (dwts.)				220.1

The gold got in these solutions was equal to 6.617 oz. and the silver 11.315 oz. The dried residue weighed 75 lbs. and assayed 4.24 oz. of gold per ton and 4 oz. of silver per ton. So that the total gold contained in the residue was 0.159 ozs. Now, if we add the gold in the solutions to the bullion got we have an extraction of 121.6 oz. of gold, equal to 99.87 per cent. The cyanide of potassium used was 15½ lbs. The first four washes used 2 lbs. each, and the succeeding ones 1½ lbs. each. Of the 121.6 oz. of gold extracted from the charge 94½ per cent was recovered by the chlorination and 5½ per cent by cyaniding.

Now the first thing which I must say about this second experiment is that the upper tub for treating the charge was too small for the quantity in hand, and necessitated more changes of solution, both of chlorine and cyanide of potassium, than would have been necessary had more room been available, and the second remark which applies both to No. 1 and No. 2 experiment is that they were both stopped before the leaching of the gold by the KCN solution was finished. In the one case we were getting solutions of 31.5 dwts. per ton, and in the other 32 dwts. per ton, when the process was stopped, and it is clear that by a circulation of air through the leaching solution, or by some other method of oxygenating the cyanide solution, a better solvent power would have been developed, with fewer washes and less time and cost. In fact by this process applied to good cyanide slimes worth 3 to 5 oz. of gold per pound of slimes, and under fair working circumstances, I am hopeful that a very high extraction (something like 99.95 per cent) could be attained to regularly.

PROTECTION OF IRON AND STEEL.

Maximilian Toch in the *Journal of the American Chemical Society* for July, 1903, discusses the question of the permanent protection of iron and steel, which is one of the greatest importance, in view of the large extent to which steel is employed in modern construction. Both exposed and embedded iron are subject to progressive oxidation under certain conditions. Manufacturers of paints have long endeavored to devise a coating of material which will prevent corrosion and oxidation. The success of such coatings depends chiefly upon the skill of the workman and their proper application. A good paint improperly applied is relatively as poor as a paint of less merit. Red lead, for example, is condemned as often as commended; it is probable that those who have commended it have had it properly applied by skilful workmen under favorable conditions, and then have had it covered by better paint.

It is a blunder to apply a corrosive oxide to a material that will corrode. If the paint itself be a carrier of oxygen and the iron or steel be subjected to the action of alternate dampness or dryness or of air charged with carbon dioxide, progressive oxidation is sure to take place and the tensile strength of the metal to be materially reduced. Such conditions may readily occur when a beam is placed in a porous wall. If a clean, pure cement concrete is packed hard against an iron or steel surface, little or no oxidation can take place, especially if free lime has been liberated in the setting of the cement, but violent oxidation may take place if cinder concrete containing iron oxides, other metallic oxides, free chlorine or any trace of a sulphide be used. Pieces of anchor chains embedded in concrete more than 200 years have been found in Spain in a state of perfect preservation. Large quantities of metal unearthed in Italy and Greece, extremely old, embedded in cement or concrete are wonderfully well preserved. These observations led Mr. Toch to experiment with Portland cement for the protection of iron and steel. The result of his experiments leads him to conclude as follows:

1. If a proper cement paint be applied to a surface which has begun to oxidize, further oxidation will be arrested.

2. If the cement used be very fine and free from iron, calcium sulphate and sulphides of low specific gravity, it will quickly set on the surface and eventually become thoroughly fixed upon the metal so that rain will not wash it off.

3. When thoroughly applied, even to three coats, the concrete may be painted with alkali proof and adherent paint, affording absolute protection to iron, so that moisture, carbon dioxide or factory fumes will not penetrate.

4. Cement paste for application to iron or steel must be made with pure water, and the mixture must be stirred at least fifteen minutes to admit of the liberation of the lime.

5. Free lime on the surface of the cement coating is quickly carbonated, and then has no injurious action upon linseed oil paint which may, under such conditions, be applied and become extremely efficacious.

It is reasonable to believe that structural metal work coated with a layer of cement paint and further protected by a layer of hydrocarbon insulating paint, when embedded in masonry, will be perfectly immune to oxidation and probably will last for all time. A similar coating will afford sufficient protection to pipes and conduits placed in the ground and subjected to various influences, such as of moist gases, electric currents, acid and alkaline liquids. Pure Portland cement mixed with water cannot be used as a metal wash because it will not always set and is apt to crack when it does; hence it must be diluted and care must be exercised so as not to impair the strength of the cement. Voids can be prevented by careful brushing, and for certain structural work where application by the brush is inapplicable, spraying is effective, but the cement must then be applied in several layers.

The water-proofing of brick walls from the outside as a protection against penetrating rain or dampness is an important consideration. A newly laid brick contains as much as 8 oz. of water and its power to adhere to the mortar increases with the quantity of water it contains. If a linseed oil paint be applied to a newly-erected and wet wall it quickly peels off and ruins the wall for the further application of paint. However, if a proper cement mixture be applied to such a wall in the form of a paint or wash it not only adheres perfectly, but forms an excellent base for the application of a good linseed oil paint. Painting the outside wall of a building in this way is something of a protection to the iron and steel used in construction, since it prevents to a large extent the access of carbon dioxide, moisture and gases.

MANUFACTURE OF SULPHATE OF COPPER.*

By Gustave Gin.

The process herein described was invented for the purpose of producing commercially copper sulphate direct from sulphide ores, or from low grade mattes. The ore or matte is roasted in a muffle furnace sufficiently to transform the copper sulphide into oxide or sulphate. This result is only attained after the complete decomposition of sulphate of iron and partial decomposition of the sulphate of copper formed. In practice it may be considered that there is no more copper left in the form of sulphide when four-fifths of the sulphate of copper is converted into binoxide. When the roasting is complete, the ore is removed to the floor of a cooling chamber, through which sulphur dioxide gas mixed with a suitable volume of air is passed, the gas moving with the ore, which is gradually shovelled toward the end of the cooling chamber opposite to the roasting furnace.

In bringing a mixture of sulphur dioxide and air in contact with the calcined ore, sulphuric anhydride is formed by the catalytic action of ferric oxide and sulphate of copper. At a lower temperature this transforms the oxide of copper and then the ferric oxide into sulphates. Owing to the higher tension of dissociation at the temperatures through which the ore successively passes, ferric sulphate cannot be formed until after the sulphate of copper. It is best not to let the temperature fall below 500 degrees C., so as to prevent the formation of ferrous sulphate. Above 500 degrees C. only basic ferric sulphates ($Fe_2S_2O_9$, Fe_2SO_6) can be formed.

Several inventors have experimented with the idea of limiting the reactions to the sulphating of the copper, leaving the ferric oxide not acted on. This regulation of the reactions is, however, impossible and it is more advantageous to produce the largest possible quantity of basic ferric sulphate, which serves ultimately to furnish sulphuric acid to other portions of the ore.

The sulphated ore submitted to a methodical lixiviation gives hot concentrated solutions, to which while still hot ore is added that has been roasted sweet. The ferric sulphate reacts with the copper, iron being precipitated as ferric oxide according to the following exothermic reactions::

$Fe_2SO_6 + CuO = CuSO_4 + Fe_2O_3 + 45.9$ calories.

$Fe_2S_2O_9 + 2CuO = 2CuSO_4 + Fe_2O_3 + 31.2$ calories.

In this way relatively pure solutions of sulphate of copper are obtained. In order to get pure sulphate of copper, the ferric sulphate remaining in the solution must be reduced to the ferrous state and must then be separated by fractional crystallization. The solubility of pure sulphate of copper is at the maximum at temperature of about 100 degrees C., above which the solubility decreases very slowly. The solubility of ferrous sulphate is at the maximum at temperature a little below 100 degrees C., above which it diminishes rapidly, becoming nil at a

*Abstract of a paper read at the Fifth International Congress of Applied Chemistry at Berlin, June, 1903. We have previously, in our issue of August 1, presented an abstract of a paper by the same author, descriptive of a new method of extracting copper from its sulphide ores.—Editor.

temperature below 160 degrees C. This difference enables a separation to be made.

To the solution obtained by lixiviation of the ore, containing sulphate of copper and more or less ferrous sulphate, a current of sulphur dioxide is first passed through in order to reduce the ferric sulphate to ferrous. The solution, kept at nearly boiling temperature, is then filtered, after which it is pumped into a tubular copper boiler in which it is heated until a pressure of 10 kg. is indicated by a mamometer; at this pressure the temperature is about 180 degrees C., at which ferrous sulphate can no longer remain in solution, while copper sulphate is still very soluble. It is advantageous to use concentrated solutions, but the concentration should not be allowed to reach the maximum saturation point for copper sulphate, since otherwise a little of the latter will be precipitated along with the ferrous sulphate. A concentration of 350 to 400 grams of copper sulphate per liter of solution is favorable to the process. It is necessary to have an active circulation through the tubes of the boiler, in order to prevent the formation of deposits which may adhere to the sides of the tubes. If such deposits are formed, however, they are easily removed by washing with cold water when the boiler is not in use.

The solution from which the iron has been precipitated, as above described, is then filtered by means of a press, the hollow plates of which are heated by steam at 10 kg. pressure in order to delay the cooling of the solution as much as possible. A clear solution of copper sulphate runs from the press to the crystallizing vat. When the pores of the filter cloths become clogged with the precipitate of ferrous sulphate, the solution to be filtered is diverted to a second press, the plates of the first press being washed in the meanwhile with pure water, which rapidly dissolves the ferrous sulphate, the circulation of steam through the press being, of course, checked. As soon as the first press is perfectly cleaned it can be put in use again. In this way, the two presses are used alternately. There is no necessity to remove the plates of the presses, except for the purpose of replacing worn-out filter cloths. The purified solution of copper sulphate is crystallized in lead lined wooden vats. Strips of lead are suspended in the vats for the crystals of copper sulphate to attach to. The crystallization is completed in about five or six days, after which the mother liquor is drawn off and put again into circulation for the production of fresh sulphate. The crystals are drained and dried by means of a centrifugal machine.

LIGHTING OF WORKSHOPS.

Good light in a factory or workshop is an important consideration in connection with the obtaining of the maximum efficiency of the labor, but we know of no rule as to the proper proportioning of the windows to floor space, etc. According to C. Zimmermann, M. D., in the *Journal of the American Medical Association*, Jan. 19, 1901, a schoolroom, to be thoroughly well lighted, should have 30 sq. in. of glass per square foot of floor, or 1 sq. ft. of glass to 5 sq. ft. of floor; the window sill should be at least 40 in. above the floor, in order to prevent glare from below, and the walls of the building should be chamfered at the windows, on the inside. These data may be a guide in factory design, but we conceive there are many other factors to be considered, such as height of the stories, relation between floor space and length or width of the room, exterior obstructions to light, etc. A one-story building 200 by 200 ft., might have windows 10 ft. high all the way round the outside, giving a ratio of glass to floor of approximately 1 to 5, and yet not be thoroughly well lighted. Such a building would doubtless be designed with illumination from above, either by means of monitor sky-lights, or by a roof construction of the saw-tooth type. The character of the glass used in the windows is also a factor. We find in our notebook the statement, authority unknown, that light is diminished 13 per cent by the interception of polished plate glass ¼ in. thick, 30 per cent by rough cast plate, ¼ in. thick, 53 per cent by rough, rolled glass, ¼ in. thick, and 22 per cent by 32 oz. sheet glass.

CEMENT TRADE OF GREAT BRITAIN.—It can still be remembered when British cement was an important product in the industrial centers of the world, but in recent years the situation has changed materially. The rapid growth of the cement industry in the United States and other countries, followed by keen competition among manufacturers, explain the gradual overshadowing of British supremacy in the world's markets. A noteworthy feature also is that the imports into Great Britain in the seven months ending July 31 amounted to 155,944 long tons, which is equivalent to over 67 per cent of the total exports of 231,302 tons. These exports were made chiefly to the British colonies, which have taken more than last year. The salvation of the export trade will depend largely on the continued improvement in building operations in South Africa, Australia and the East Indies.

THE GOLDSCHMIDT ALUMINUM HEATING PROCESS.—H. Bertin, in *Memoirs de la Société des Ingenieurs Civils de France,* summarizes the advantages realized in the method of generating heat by the reducing action of aluminum or magnesium originated by H. Goldschmidt. The metals and alloys thus prepared are free from impurities, especially from carbon, which is not an ingredient of the reacting mixture. The use of suitable oxides affords the means of obtaining without cumbersome apparatus the highest temperatures as yet possible to be attained, even electrically. The heat to be developed can be precisely determined beforehand and can be accurately controlled.

TOUGHENING MANGANESE STEEL.—R. A. Hadfield, of Sheffield, has patented the process (British patent 5,604, March 6, 1902), for toughening manganese steel, wherein the steel is heated very slowly to 750 degrees C. to 800 degrees C., and then is heated as quickly as possible to the temperature at which it is to be plunged into cold water, this temperature varying from 940 degrees C. to 1,125 degrees C., according to the quality of the steel, but being preferably between 980 degrees and 1,050 degrees C. for castings and 940 degrees to 1,000 C. for forged steel. The proportion of "hardening carbon" in the steel diminishes as the temperature for quenching is raised, so that with the higher temperature the steel is tougher and less hard.

The iodide of copper (Marshite) is a rare mineral, first found in the ores of the Broken Hill lode, in New South Wales. Iodine has also been detected in cuprite and malachite. In some specimens the iodine was present to a degree sufficient to give the occurrence a commercial importance.

BOOKS RECEIVED.

In sending book for notices, publishers, for their own sake and for that of book buyers, should give the retail price. These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

Notes on Some Fresh-Water Fishes from Maine. By William Converse Kendall. Washington, D. C.: Government Printing Office. Pamphlet, pages, 16.

Thirty-Fifth Annual Report of the Department of Marine and Fisheries of Canada, 1902. Ottawa, Can.: H. M. Printer. Pages, 148; illustrated. Price, 20c.

Report on a Geological Reconnaissance of the Iron Region of Angat, Bulacan. By H. D. McCaskey. Manila, P. I.: Public Printer. Pages, 62, with maps and illustrations.

The World's Commerce and American Industries. Prepared by John J. Macfarlane. Philadelphia, Pa.: The Philadelphia Commercial Museum. Pages, 112, with 86 charts. Price, 50c.

United States Geological Survey: The Production of Chromite or Chrome Iron Ore in 1902. *The Production of Lithium in* 1902. *The Production of Tungsten, Molybdenum, Uranium and Vanadium in* 1902. *The Production of Asbestos in* 1902. *The Production of Fluorspar and Cryolite in* 1902. *The Production of Barytes in* 1902, *with a note on Strontium.* All by Joseph Hyde Pratt. Washington, D. C.: Government Printing Office. Pamphlets, being extracts from *Mineral Resources of the United States for* 1902.

BOOKS REVIEWED.

Quantitative Chemical Analysis by Electrolysis. By Professor Alexander Classen. Authorized translation from the fourth German Edition, revised and enlarged by Bertram B. Boltwood. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. Pages, 315; illustrated.

Prof. Classen's well-known treatise is the standard authority on this subject. The fourth German edition differs from the previous editions in having the introduction amplified by the insertion of a section devoted to theory, while the book has been made more complete by the description of a variety of measuring instruments, source of current and other apparatus, besides simple and complete appliances for carrying out electrolytic experiments. According to the translator's preface the chief object in preparing the present English edition has been to include a considerable number of new electro-analytical methods which have been published since the appearance of the fourth German edition in 1897.

The treatise is divided into three parts. The first part comprises 18 chapters, as follows: Historical; theory of solution; electrolytes; current strength and potential; Farraday's law, Ohm's law; migration of ions, conductivity of solutions; electrolysis; electromotive force; polarization; electrochemical analysis; determination of electrical magnitudes, source of current; regulating current-strength and potential; accessory apparatus; the analytical process; arrangements for analysis. The second part comprises five sections, as follows: Quantitative determination of metals; determination of nitric acid in nitrates; determination of the halogens; separation of metals; separation of the halogens. The third part comprises two sections, one devoted to applied examples of electrochemical analysis and the other to reagents. The book is well printed and is properly indexed.

Earth Work and Its Cost. By H. P. Gillette. New York: Engineering News Publishing Company, 1903. Pages, 244; illustrated.

This book comprises 18 chapters and three appendices. The various chapters treat of earth shrinkage; earth classification; cost of loosening and shoveling; cost of dumping, spreading, rolling, etc.; cost by wheelbarrows and carts; cost by wagons; cost by buck and drag scrapers; cost by wheel scrapers; cost by the elevating grader; cost by steam shovels; cost by cars; how to handle a steam shovel plant; summary and table of costs; cost of trenching and pipe laying; the cost of hydraulic excavation; cost of dredging; miscellaneous cost data; earth and earth structures. The scope of the work is sufficiently indicated by the foregoing list of chapters. It will be observed that especial attention is devoted to the cost of earth work. This is indeed the keynote of the book. As the author remarks in his introduction, "Engineering design is at once an art and a science. It is the science of designing structures, so as to resist the forces to which they

are subjected while performing their functions. It is the art of so designing these structures that the interest upon their first cost plus annual depreciation plus annual operating expense shall be the least sum possible of attainment. The science of engineering design has been well taught, but the art for the most part has been left to be acquired haphazard by experience." This statement is equally true of many other branches of engineering literature. There are very few treatises that are practical, telling just how to do things and how much it has cost and is likely to cost to do them in various ways. Mr. Gillette has undertaken in his book to formulate the rules and lay down the principles to be used by engineers and contractors in estimating the cost of earth work. He has done this very well and his book is to be recommended as a highly satisfactory treatise on the subject.

COST OF SMALL POWER PLANTS.—Some recent bids on high speed engines of 100 to 300 i. h. p., by high-class manufacturers, have ranged from 9c. to 12c. per lb., f. o. b. factories, the former price being on the larger engines and the latter on the smaller. These prices figure out to $11@$18 per i. h. p. An engine of 150 h. p. costs about $12.50. A good Corliss engine of the same power is obtainable for about $12 per i. h. p., or 7.5c. per lb. Good horizontal, return tubular boilers of about 100 h. p., designed for steam pressure of 100 lb., can be had for $7@$8 per h. p. Internally fired boilers of the same capacity cost about $12.50 per h. p., but the difference is partially offset by the less cost of setting. The water-tube boilers are the most expensive in first cost. A good feed-water heater can be purchased for about $1 per boiler horse-power. The total cost of a steam power plant of 300 h. p. capacity will be about $50 per horse-power.

LOSS OF IRON IN BLAST FURNACE SMELTING.—B. Osann in *Stahl und Eisen,* states that in smelting iron ore in the blast furnace, metal is lost in the form of ore carried off as dust in the gases and by the scorification of ferrous oxide in the slag. The actual loss is apparently diminished by the iron content in the coke ash and the limestone flux which is not taken into account in making up the charges. The total loss of metal ranges from nothing up to 5 per cent, and even more, in the most unfavorable cases. In smelting unroasted oolitic ores the average is probably about 3 per cent. Calcined spathic iron ore and burned pyrites residues give rise to much dust in the gases. The quantity of dust carried per cubic meter of gas discharged varies between 5 and 20 grams, the proportion of iron contained, varying between 12 and 45 per cent. With a consumption of 110 parts of coke per 100 parts of metal smelted, the coke containing 7 per cent. of ash assaying 7 to 11 per cent. ferrous oxide, which percentage of iron is to be found in the ash of Westphalian coke, the loss of iron in the form of dust carried off by the gases is completely compensated by that which is introduced in the coke.

TESTS OF PORTLAND CEMENT MORTAR EXPOSED TO COLD.—C. S. Gowen, in a paper read before the Cement Section of the American Society for Testing Materials, July 3, 1903, has reported the results of experiments to determine the effect of frost on Portland cement mortar under the different conditions in which it may be desirable to use it in cold weather. It was found that a moderately quick setting cement in a 2:1 mixture can be used at temperatures of about 20° F., without freezing. The use of brine delays freezing, at least at temperatures of about 15° F., if it does not wholly prevent it before the set has occurred. The general results of the experiments were favorable to the use of brine at low temperatures; also there was no indication that freezing reduces the ultimate strength of the mortar, although it delays the action of setting. In commenting upon Mr. Cowen's tests, the *Engineering News* remarks that there is now less fear than formerly of using cement in freezing weather, but there are probably few engineers who would do it if it were avoidable. Mr. Cowen's tests can hardly be said to have shown this precaution unnecessary, but they will relieve the mind of the engineer who has to use mortar in freezing weather of some of the nervousness with which he has in the past watched the progress of structures built in cold weather.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquiriers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Alcohol from Potatoes.—Can you answer some questions with regard to the economic use of potato alcohol? How is it used for light and power? Is there a special burner for lighting or is there a gas generating? Is there any internal revenue tax upon it when used for mechanical purposes? What is the method of making it? Is it similar to that used for making alcohol from corn? Can you recommend any literature on the subject? Would it be profitable to raise potatoes in this country for this purpose?—V. G.

Answer.—Alcohol made from potatoes is very similar in its constitution and properties to alcohol made from corn or other grain. As for lighting we are not aware that it has ever been used for that purpose in this country. It has been used in France and Germany and special burners have been devised in those countries for alcohol lamps. Here the so-called alcohol lamps are used only for heating purposes, boiling water or occasionally in chemical laboratories. For generating power some experiments were recently made with alcohol in engines built for using kerosene by the Mietz & Weiss Engine Company, of New York, which showed very successful results. Reference to these experiments was made in THE ENGINEERING AND MINING JOURNAL at the time. The action is very similar to that of the petroleum oil, or distillate, used in engines of that type. The method of making alcohol from potatoes is by distillation and does not differ materially from that used with grain. You can obtain information about the process by consulting Wagner's "Chemical Technology."

There is an internal revenue tax on all alcohol made, this tax being equal to four or five times the cost of manufacturing the article. Efforts have been made from time to time to have this tax removed from alcohol, which is intended for consumption in the mechanical arts; but these efforts have not succeeded. It is understood that a bill for that purpose will be brought before Congress again at its next session. As to your last question, it would be difficult to say whether it would pay to raise potatoes for that purpose. In France and Germany the manufacture has been taken up because there was a surplus of potatoes which could be had very cheaply, and the real question was one of finding an outlet for that surplus. Certainly it would not pay to make potato alcohol as long as the present tax is imposed. Grain alcohol is better for most of the purposes for which it is now used. Should the tax be removed, it might possibly pay to use potatoes in that way; but that is a question that would probably have to be settled by experiment. In most parts of this country oil can be had so cheaply for lighting or mechanical purposes and it is in such general use that it would probably be a slow process to educate people into substituting low-priced alcohol.

The clipping you send is one of those stray newspaper items which are written without considering the differences in conditions in different countries, and which are therefore very misleading.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared:

Week Ending August 25, 1903.

736,924. METHOD OF RECOVERING TIN FROM SCRAPS OF TINNED IRON.—Bror. A. Bergman, Nyfors, Sweden. An improved method which consists in providing a solution of caustic alkali containing a depolarizer, in placing the scrap as a negative pole and a metal electropositive to the same as a positive pole in contact with the solution, permitting the tin to dissolve into stannate of the alkali, and to generate a current, and finally recovering the tin.

736,929. ROASTING FURNACE.—Edward C. Brice, Colwyn, Pa. A roasting furnace comprising the tunnel, the trackway therein, fire-boxes communicating with the upper part of the tunnel, and the passage ways communicating between the latter and the smoke stack, in combination with the series of cars on the trackway having the receptacle of refractory material, the sides of the receptacles having openings therethrough, and the bottom portion thereof having the lateral passage ways and the vertical passage ways communicating therewith.

736,946. APPARATUS FOR DISPOSING OF FOUL GASES.—Eugene R. Edson, Cleveland, Ohio, assignor to the Edson Reduction Machinery Company, Augusta, Me., a corporation of Maine. Comprising a tank having an outlet at the top for any gaseous or aeriform fluid not soluble in water, a valved water-supply pipe communicating with the chamber of the tank at the bottom of the tank, a perforated pipe-section arranged within and near the bottom of the chamber and extending longitudinally of the tank, a pipe for conducting gases and vapors to the tank and in open relation with the perforated pipe-section, a sewer-feeding pipe arranged below the tank, an upright pipe in open relation at one end with the sewer-feeding pipe and communicating at its opposite end with the upper portion of the chamber and a valved drain-pipe communicating with the chamber at the bottom of the tank and discharging into the upright pipe.

736,967. ACETYLENE GAS GENERATOR.—Henry Hawkins and Samuel H. Hawkins, Upton Park, England. In acetylene generators, the combination with a water-supply tube and a generating-chamber, of means for feeding the water to the carbide in the generating-chamber, comprising a sleeve or chamber located in the water-supply tube and having a small aperture in its upper end, a longitudinally-grooved piece removably fitted in its lower end, and a needle fitted in the grooved piece and projecting upward through a small aperture in the chamber.

736,971. POWER HAMMER.—William R. Jenkins, Bellefonte, Pa. The combination with a helve, a cylinder, automatically-operating inlet and outlet valves, a plunger in the cylinder connected with the helve and means for regulating the escape of air from the cylinder through the outlet valve when the helve descends.

736,973. MOLD FOR CEMENT RECEPTACLES.—John A. Johnson and John G. Young, Greenfield, Ind., assignors of one-third to Charles S. Duncan, Greenfield, Ind. In such a mold a removable rectangular middle portion in a plurality of transversely-divided parts saparable between the corners of the mold, bars connecting the parts, the bars having longitudinal slots, bolts passing through the parts and through the slots of the bars and nuts on the ends of the bolts to tighten the mold together.

736,982. ELECTROLYTIC DECOMPOSITION OF SALINE SOLUTIONS.—Arthur B. Larchar, Oldtown, Me. Assignor to the Penobscot Chemical Fibre Company, a corporation of Maine. In combination, the anode, the diaphragm, and a cathode consisting of a series of gratings and means whereby the gratings are united at their edge; the cathode constituting a substantially vertical polygonal inclosure for the diaphragm.

736,993. ARTESIAN OR OIL DRILLING MACHINE.—David A. Messner, Akron, Ohio. The combination of the frame, a shaft mounted therein, means for driving the shaft, a gear wheel on one end of the shaft, a pitman having one end connected with the gear-wheel, a shaft paralled with the driving-shaft, a crank-arm secured thereto and connected to the other end of the pitman, and arm secured to the last-mentioned shaft, a guide-pulley carried by the free end of the arm, an angle-lever, a link pivotally connected with the short arm of the lever, a lever pivotally connected with the opposite end of the link and a movably-mounted bearing-box, a shaft mounted therein, a drum carried by the shaft, a rigid rope-guide secured to the frame, and a rope passing around the guide-pulley.

737,003. APPARATUS FOR CONDENSING FUMES FORMED IN VOLATILIZATION PROCESSES.—Robert McKnight, Philadelphia, Pa. The combination of the bowl, the cover, the fume-pipe leading into the central part of the bowl, the water-supply pipe also leading into the central part of the bowl, the trough, and means for imparting centrifugal force to the water within the bowl.

737,020. HYDROCARBON BURNER.—Frank A. Reynolds, Lewiston, Me. Assignor by mesne assignments, to F. A. Thomson, trustee, New York, N. Y. A hydrocarbon burner, comprising a transverse mixer provided with a longitudinal series of perforations, a series of concentric tubes arranged on each side of the mixer and connected therewith, the concentric tube being provided with burner-openings, a volatilizer projecting from the same end of the mixer, and a valve receiving the discharge from the volatilizer and discharging into the mixer.

737,023. COMPOSITION FUEL.—Frederick C. Rockwell, West Hartford, Conn. A brightly-inflammable fuel composed of pieces of hard porous carbonized peat impregnated with metallic sulphate and chloride of sodium.

737,024. COMPOSITION FOR ARTIFICIAL STONE.—Louis Roehm and Paul Walther, Chicago, Ill. A composition of a chemical fluid containing magnesium bromide two parts; salts of sodium, one part; potassium sulphate, one part; muriate of aluminum from three-fourths to five-fourths parts reduced to a solid mass by pressure, and a sufficient quantity of water to dissolve this solid mass, and reduce the acidity of the resultant chemical fluid, with a combination consisting of one part of magnesia and from two to four parts of gravelly sand, mixed together dry.

737,032. MOLD FOR CONCRETE BLOCKS.—Frank A. Sicklesteel and Charles W. Ballard, Northbranch, Mich. The combination with the frame having downwardly-beveled inner faces; of a stripping-plate having core-openings and provided with mortises in its outer face in line with the core-openings; cross-bars removably seated in the mortises; cores fixed to the cross-bars and projecting into the mold through the core-openings; separable side members; and laterally-extending beveled flanges carried by the side members and adapted to register with the downwardly beveled faces of the frame.

737,041. ACETYLENE GAS GENERATOR.—Charles M. Stroud, Minneapolis, Minn. Assignor of one-half to Albert J. Murdock, Minneapolis, Minn. A carbide holder having at its lower end a cup of less diameter than the holder and connected at its lower end to the body of the holder, by a flange having restricted water passages.

737,046. PRECIPITATING ZINC BOX.—James B. Truitt, Warren L. Truitt, and William O. Temple, Cripple Creek, Colo. Assignors of one-fourth to Beauregard Ross, Denver, Calo. The combination with an outer imperforate box, of an inner removable perforate zinc-holding box.

737,055. PIGMENT AND PROCESS OF MAKING SAME.—William J. Armbruster, St. Louis, Mo. The process consists in mixing solutions of zinc sulphate, a carbonate of an alkali metal, and a salt of barium incapable at the time of its addition, of precipitating the zinc, and recovering the resulting precipitates.

737,059. ART OF TREATING REBELLIOUS OR REFRACTORY ORES.—Aron M. Beam, Denver, Colo. Assignor to the Beam Converting Furnace Comany, a corporation of Colorado. The process consists in first pulverizing the ore; second, subjecting it, in connection with a suitable oxidizing flux mixed therewith, in a closed oven, to the action of a low degree of indirect heat while the air is excluded for a short time, until the sulphides of the base metals are partially converted into sulphates, so that air may be afterward admitted without burning the sulphur or causing cementation of the ore particles with sulphur or other residuum; third, admitting air to the ore in the muffle and completing the conversion of the sulphides of the base metals into sulphates and the releasing of the precious metals to amalgamating condition by subjecting the ore for a further short time to a low degree of indirect heat.

737,060. ART OF TREATING ORES FOR RECOVERY OF ZINC AND COPPER.—Aron M. Beam, Denver, Colo. Assignor to the Beam Converting Furnace Company, a corporation of Colorado. The process is similar to that described in patent 737,059, as above.

737,061. PROCESS OF RECOVERING PRECIOUS METALS.—Aron M. Beam, Denver, Colo., assignor to the Beam Converting Furnace Company, a corporation of Colorado. Filed May 12, 1899. Serial No. 716,599. (No specimens.) Claim 1. The process is similar to patents 737,059 and 737,060, and finally regrinding the converted ore, and then separating the gold and precious metals from the ore by amalgamation.

737,063. CENTRIFUGAL MACHINE.—John J. Berrigan, Orange, N. J. Assignor to Francis J. Arend, New York, N. Y., and John Bernstrom, Stockholm, Sweden. In a centrifugal machine, a rotary shaft, a separating device carried and rotated by the shaft, and a second separating device supported within and upon the first device, the device being provided with openings whereby the combined materials are introduced into the inner device and after separation one of the materials is conducted to the outer device.

737,065. FORGING MACHINE.—John R. Blakeslee, Glenville, Ohio. Assignor to the Ajax Manufacturing Company, Cleveland, Ohio, a corporation of Ohio. The combination of a reciprocable die-slide for gripping and holding the work, a reciprocable header-slide co-operating with the die-slide, and a series of compounded lever elements connected by links and connecting the two slides, and mounted upon three fulcrums fixed upon the machine-frame and forming circumferentially-movable joints.

737,069. ENGINE WORKED BY OIL VAPOR OR GAS.—William Brown, Melbourne, Victoria, Australia. In these engines a mixing appliance comprising a casing secured to cylinder and having an annular row of openings in its end, and a cap having a corresponding annular row of openings to register with the openings, a rack on the cap edge, a worm-rod for actuating cap, and means for indicating the relative positions of the openings, a screw-rod, a shell within the casing and formed with a passage for the oil-vapor, a ring on the rod having diagonal circumferential grooves, and a conical head beyond same, a conical portion having an annular row of inclined openings directed toward a central point.

737,099. PROCESS OF MAKING MINERAL WOOL FELT.—Charles C. Hall, Alexandria, Ind. Assignor to American Insulating Material Manufacturing Company, St. Louis, Mo., a corporation of Missouri. The process consists in placing the mineral wool in water, and forcing air diffusedly up through the water and mineral wool.

737,101. WELL CASING SPEAR.—Ralph I. Henderson, Cairo, W. Va. In a well casing spear having vertically movable jaws, and a plunger for operating the jaws, a trigger for holding the plunger depressed having its end formed with a frustum-shaped latch, and the plunger having a notch therein with its base formed with a concave surface shaped to fit the plunger.

737,105. FURNACE DOOR.—Joseph Hovath, Szekesfehervar, Austria-Hungary. Assignor of three-fourths to James Grunhut, London, England, and Ferdinand Toth, Szekesfehervar, Austria-Hungary. In combination with a furnace, a door having a diaphragm, and an inner wall having an aperture smaller than the diaphragm and in position to direct the air without substantial obstruction radially inward so as to concentrate and direct the air axially of the furnace, whereby the flame is caused to pass around the air.

737,117. APPARATUS FOR TRANSFERRING DETINNED SCRAPS.—Martin Laernoes and John Dunn, Streator, Ill. Assignors to the Vulcan Detinning Company, New York, N. Y., a corporation of New Jersey. An apparatus consisting of stationary guideways, a carriage provided with handles supported on the same sheaves, a guide-sheave suspended on the rope between the sheaves of the carriage, a suspension-bar carried by the guide-sheave, a plurality of hooks attached to the bar, and means for raising or lowering the suspension bar.

737,121. ELECTRIC FLUID TURBINE.—Tore G. E. Lindmark, Stockholm, Sweden. The combination with the casing and its inlet and exhaust passages of the turbine wheel comprising a body and circumferential buckets detachable, secured to the periphery of the body and having oppositely facing recesses.

737,123. PROCESS OF PRODUCING CHLORIDE OF CARBON.—Florentine J. Machalske, Chicago, Ill. Assignor of one-half to Charles Herbert Lyon, Chicago, Ill. The process consists in heating a mixture of a carbonaceous substance, a chlorine compound and an agent which will combine with the base of the chlorine compound, to a temperature sufficient to effect the reaction.

737,126. APPARATUS FOR HEATING BOLT BLANKS, RIVETS, RODS, ETC.—William W. Mulford and Francis C. Caldwell, Columbus, Ohio. The combination with a furnace and a conveyor, having holders to receive blanks and extend the ends thereof into the furnace.

737,127. ROTARY ENGINE.—John F. Muncey, Everett, Wash. In a rotary engine, the case having cylindrical valve chambers, inlet ports, exhaust passages, and the rotary wheel provided with pistons in combination with valve, provided with a shank projecting in the path of the pistons, shanks being fulcrumed eccentric of the valve-chamber.

737,128. FURNACE.—Thomas Murphy, Detroit, Mich. The combination with a grate and a refractory wall, the top of the wall forming a fuel supporting and igniting ledge extending substantially the entire width of the grate.

737,130. CRUSHING ROLLS.—Cyrus W. McArthur and Franz Cazin, Denver, Colo. The combination with the bed, a roll mounted in fixed bearings, a second roll, movable bearings in which the roll is journaled, sliding adjusting rods mounted on the frame and in threaded engagement between their ends with the movable bearings, stops on one end of the rods to limit the return movement of the movable bearing, and a spring mechanism at the opposite ends of the rods and against the action of which the movable bearings move away from the fixed bearings.

737,162. APPARATUS FOR ELECTROPLATING SMALL METALLIC ARTICLES.—John F. Shelton, Fort Worth, Tex. An apparatus comprising a trough containing a solution, anodes suspended in the solution, a frame removably mounted in the trough, a wooden shaft mounted in the lower part of the frame, a perforated wooden cylinder mounted on the shaft, means for revolving the cylinder, means for making electrical connection with the anodes, and means for making electrical connection with each end of a mass of metallic articles moving in the cylinder during the revolution of the cylinder.

737,169. MACHINE FOR MOLDING ARTIFICIAL STONE. Ervin W. Stevens, Norristown, Pa. In combination a mold-wheel, a plurality of plungers carried thereby, and means for driving the plungers.

737,183. ACETYLENE GAS GENERATOR.—Richard H. Welles, Kenosha, Wis. Assignor to the Badger Brass Manufacturing Company, Kenosha, Wis., a corporation of Wisconsin. The combination with a water chamber, of a generation chamber within carrying a carbide receptacle, a water supply pipe extending across and through the upper end of the generation chamber, and a gas discharge pipe leading from the generation chamber.

737,196. ACETYLENE GAS GENERATOR.—Charles W. Beck, New York, N. Y. Assignor, by mesne assignments, to Electrolite Gas Lamp Company, New York, N. Y.

737,218. COMPRESSION GREASE CUP.—Frederick N. Gardner, Beloit, Wis. Assignor to Charles H. Besly, Chicago, Ill. A compression grease cup, comprising a circular base having its perimeter screw threaded, and a sheet metal screw threaded compression cap made slightly elliptical to afford yielding pressure of its opposite side portions against the base.

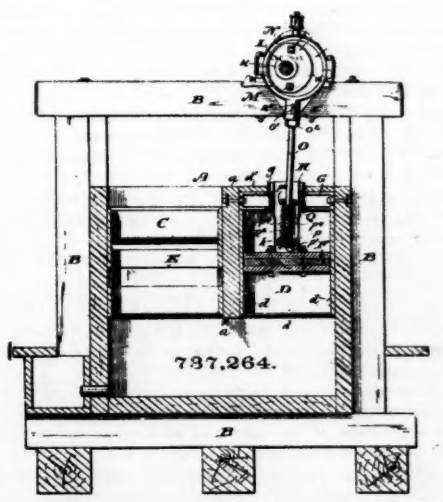
737,224. GRADING AND DITCHING MACHINE.—Thomas J. Gray, Chicago, Ill. Assignor to Frederick C. Austin, Chicago, Ill. This machine comprises a suitable frame provided at each end with a fifth wheel and mounted upon vehicle wheels, a plow beam with plows arranged at one side of the frame, and a conveyer arranged to receive the soil.

737,229. COMBINATION FUSE.—Oscar Hartman, Essen-on-the-Ruhr, Germany. Assignor to Fried Krupp, Essen-on-the-Ruhr, Germany. A fuse having means made of harder material than the body of the fuse to protect a part of the fuse against distortion.

737,236. FIBROUS OR FILAMENTARY MATERIAL.—Charles N. Holmes, London, England. The method consists in boiling the fiber in an alkaline solution; then treating it by a combined dyeing and mordanting bath containing a suitable salt with which the fiber is impregnated; then drving and combining the fiber; then immersing the fiber in a bath containing glue, water black, a suitable acid, and water heated; then finally drying the fiber and combining it again.

737,233. ABSORBER FOR THE MANUFACTURE OF SULPHURIC ACID.—John B. F. Herreshoff, New York, N. Y. Assignor to General Chemical Company, New York, N. Y., a corporation of New York. An absorber for gaseous substances comprising a receptacle having an inlet with a funnel-shaped enlargement and an annular perforated plate extending outwardly from the enlargement at its lower end, and an outlet for keeping the level of the liquid contained in receptacle above the plate, so that the latter will be immersed in the liquid.

737,264. ORE JIGGER.—Ernst J. Muller, Butte, Mont. In an ore jigger the combination with a tank separated by a partition into compartments which communicate with each other below the partition, and a horizontally disposed screen and vertically movable plunger arranged in the compartments on opposite sides of the partition, of a guide arranged in the upper part of the compartment containing



737,264.

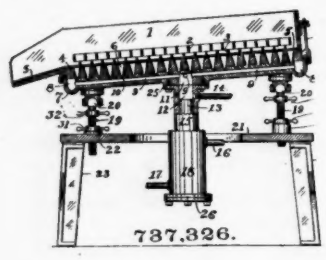
the plunger, a hollow trunk attached to and extending upwardly from the plunger into an opening in the guide, a driving shaft extending horizontally over the tank and provided above the plunger trunk with an eccentric and strap, a rod attached at its upper end to the strap and provided at its lower end with a box which is pivoted on a cross pin in the lower part of the trunk, and a spring interposed between the upper box member and the cross head.

737,274. PUMP.—George C. Richards, Berkeley, Cal. The combination of two telescoping cylinders, inwardly opening valves in each of cylinder and means extending into

the path of the lower end of the movable cylinder adapted to prevent the end of the cylinder coming in contact with the bottom of the well.

737,299. HYDROCARBON INJECTOR.—William W. Tuck, Richmond Hill, and Abbot A. Low, Brooklyn, N. Y. Assignor to said Low. The combination of a gas engine and an injector casing extending into the interior of the chamber and having threaded inner end, of a tip having exterior threads engaging the interior threads of the inner end of the casing and formed with a plurality of needle spray passages, the casing being formed with a seat adjacent the outer terminal of the threads, a valve stem disposed longitudinally of the casing and formed with longitudinal grooves, and a valve on the inner end of the stem fitted to the seat and its inner face being provided with an offset head.

737,326. ORE CONCENTRATOR.—Calvin A. Bonner and Edward E. Euchenhofer, Dayton, Ohio. Assignors to Daniel M. Stewart, Xenia, Ohio. In an ore concentrator operated by means of motive fluid-pressure a bed having diagonally arranged strips placed over a flexible section which is supported by a ribbed frame resting upon a corrugated bottom having air passages diverging from an opening



737,326.

in its center, a cylinder arrangement placed under the opening of the corrugated bottom and the cylinder consisting of an enlarged part in which is operated a large piston to the upper part of which is attached a smaller piston which acts as a valve opening and closing the intake pipe for the fluid pressure, and means for holding and regulating the position of the machine.

737,334. COMPOUND FOR ARTIFICIAL STONE.—James S. Burns, Ann Arbor, Mich. Assignor of one-third to George P. Goodale, Detroit, Mich. An artificial stone composed of Portland cement and sand moistened with water in which have been dissolved silicate of soda, copper, salt, sulphuric and hydrofluoric acid, in which is held in suspension litharge, the stone being treated while curing with a wash of diluted nitric acid.

737,336. PUMPING APPARATUS.—Francis C. Cain, Beaumont, Tex. Assignor of one-half to Oscar Charles Herrenkind, Beaumont, Tex. The combination with a conducting pipe of an air supply and an air exhaust having communication with the conducting pipe, means for controlling the communication, operating mechanism for moving the controlling means, and a lock for holding the operating mechanism against movement.

737,361-737,362. APPARATUS FOR TREATING WIRE RODS.—Fred H. Daniels, Worcester, Mass. An apparatus comprising a reel receiving the rods from the finishing rolls, a casing forming a housing for the reel and a cooling chamber for the rods, means for excluding air from the casing, and means for passing the coils from the reel through the cooling chamber.

737,408. TWO PART HOISTING BUCKET.—Albinus E. Howes, West Pullman, Ill. The combination with two relatively movable parts, of a cross bar upon which the two parts are pivotally supported, guide arms supported by the cross bar and extending in opposite directions over the two parts of the bucket, a hoisting cable connected to the cross bar, and a trip-line connected to the outer ends of the two parts of the bucket and guided by the arms.

737,423. CATHODE FOR ELECTRIC DETINNING BATHS. Martin Laernoes and John Dunn, Streator, Ill. Assignors to the Vulcan Detinning Company, New York, N. Y., a corporation of New Jersey. A plate of sheet iron or steel provided at the upper end with a hand hole, a suspension rod formed of two sections and attached to the upper edge of the plate, and an exterior facing at one end of the bar.

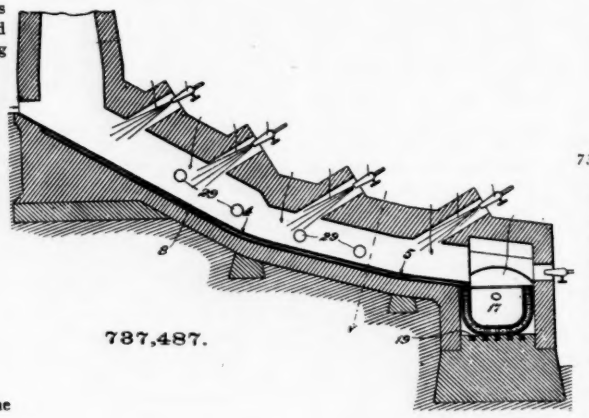
737,424, 737,425, 737,427. MACHINE FOR COMPRESSING DETINNED OR OTHER SCRAPS.—Martin Laernoes and John Dunn, Streator, Ill. Assignors to the Vulcan Detinning Company, New York, N. Y., a corporation of New Jersey. The machine consists of a stationary foundation plate provided with an opening, a plurality of upright receiving boxes, the means for imparting a step by step rotary motion to the receiving boxes, an anvil below the opening of the foundation plate, and a vertically reciprocating plunger located vertically above the opening of the foundation plate.

737,426. HOISTING AND DUMPING APPARATUS.—Charles Lamar, Jackson Township, Ind. Combination of a frame, a winding drum, a stationary pulley block, a movable pulley block, a rope reeved through the pulley blocks and attached to the drum, a guide pulley mounted in the frame, a counterweight, a sling beam connected to the movable pulley block, sling links connected to the sling beam and a latch for the drum.

737,466. TUNNEL CONSTRUCTION.—David Phillips, Pony, Mont. In a tunnel construction, an expansible casing in which the tunnel wall may be built, and means for anchoring the casing under water.

737,468. PROCESS OF FIREPROOFING WOOD.—Arthur M. Pierce, Brooklyn, N. Y. Assignor to Bradford L. Gilbert and William H. Peddle, New York, N. Y. The process consists in saturating the wood with a solution of fireproofing salts in water and a monatomic alcohol which is a solvent of resins, and then drawing off the solution and drying the wood.

737,487. SMELTING FURNACE.—Elfego Riveroll, Los Angeles, Cal. An inclined chamber, combustion chambers disposed along the inclined chamber and communicating



737,487.

therewith, and burners in the combustion chambers and directed downwardly.

737,500. METALLIC FRAMING FOR CONCRETE TANKS.—John W. Seaver and James E. A. Moore, Cleveland, Ohio. Assignors to the Wellman-Seaver-Morgan Engineering Company, Cleveland, Ohio, a corporation of Ohio. A metallic framework for concrete tanks comprising supporting columns, a girder mounted thereon and extending around the tank, the girder carrying rods which support the bottom of the tank, and vertical side rods connected to the girder.

737,505. WELL DRILLING APPARATUS.—Leonard D. Shryock, Marietta, Ohio. A pitman for well drilling apparatus comprising two pitman sections movable longitudinally with relation to each other, a head at the inner end of each section, a succession of coiled springs embracing the inner pitman section between the heads, disks movable on the inner pitman section, and an upwardly projecting stop on each disk adapted to engage and limit the movement of the disk next above.

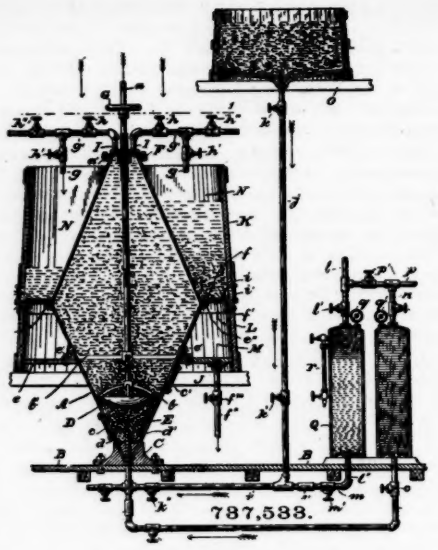
737,519. METALLURGICAL FURNACE.—Samuel Stewart, Brighton and Harry Hughes, Woodward, Ala. In a metallurgical furnace provided with a hopper at the upper end thereof, the combination with a frame mounted above the furnace, of an inclined track having a curved end carried by the frame, a car provided with four wheels traveling on the track, and a hoisting rope secured to the rear end of the car.

737,520. GAS SEAL FOR METALLURGICAL FURNACES.—Samuel Stewart, Brighton, and Harry Hughes, Woodward, Ala. The combination with a hopper, and a cone beneath the same, of a plurality of swinging gates hinged to the bottom of the hopper, a cylinder for each gate trunnioned on the cone and provided with a piston and piston rod, a lever pivoted to and passing through the shell of the cone and connected to the piston rod, and a connecting rod between the opposite end of the lever and the hinged gate.

737,523, 737,524.—ACETYLENE GENERATOR.—John Summerfield, Dallas, Tex. In an apparatus for generating gas provided with a generator, a gas storage tank, and suitable pipes connecting the parts; means for sprinkling water on the carbide in the generator consisting of a water tank, a pipe leading from the tank into the generator, and a sprinkler attached to the pipe.

737,532. SPARKING IGNITER FOR GAS ENGINES.—Benjamin L. Toquet, Westport, Conn. In a gas engine, the combination of the fixed electrode and the movable electrode with a rod to operate the movable electrode, an interposed spring on the rod and a socket surrounding the rod and spring and a dash pot at the lower end of the socket.

737,533. APPARATUS FOR EXTRACTING GOLD AND OTHER METALS FROM ORES.—Edmund L. Vander Naillen, San Francisco, Cal. An apparatus comprising a concentrating tank provided with an inlet and an outlet, and a valve disposed transversely within the tank and operating when closed to separate the lower portion of the tank from the upper portion thereof.



787,588.

737,545. WELL DRILLING APPARATUS.—Clyde S. Wright, Quaker City, Ohio. The combination with the framing of a drive shaft mounted therein, a driving gear attached to the shaft, a bull drum, a lever in which one end of the bull drum is mounted, means for swinging the lever, a bull wheel in connection with the bull drum and adapted to be moved therewith to engage or disengage the drive wheel, a sand reel, a standard, a box arranged to swing on the standard and having one end of the axis of the sand reel mounted therein, a gear in connection with the sand reel, a lever carrying the other end of the axis of the sand reel, means for operating the lever to throw the gear of the sand reel into or out of engagement with the driving gear, and a brake block arranged at the side of the sand reel gear opposite the driving wheel, to be engaged by the sand reel gear as the gear disengages the driving gear.

737,554. ELECTROLYTIC APPARATUS.—Linus P. Burrows, Washington, D. C. An electrolytic apparatus comprising a dissolving vessel, a filter, and a depositing vessel; an anode in the dissolving vessel, a cathode in the depositing vessel, and means for conveying an unbroken stream of liquid from the dissolving vessel into the filter and from the filter into the depositing vessel.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending August 8, 1903.

17,617 of 1902. COPPER EXTRACTION FROM RESIDUE.—H. Mennicke, Hoechst, A. M., Germany. Extracting copper from residue, by heating with nitre cake and lixiviating, the copper being recovered as sulphate.

20,496 of 1902. RECOVERING TIN AND ZINC FROM SCRAP.—L. Wirtz, London. First dissolving the tin in hydrochloric acid and then immersing the galvanized iron scrap in the solution of chloride of tin, the tin thus being precipitated and recoverable, while the zinc goes into solution as chloride.

5,902 of 1903. TREATING CHROME ORES.—Chemische Fabrik Gresheim Electron, Frankfurt, A. M., Germany.—Treating chrome iron ores with sulphuric acid in the presence of an oxidizing agent, ferric sulphate being formed which can be separated from the chromium.

10,431 of 1903. RUBBER DISCS FOR MILLS.—P. B. Bradley, Hingham, Mass. The provision of rubber discs at various parts of the frame of centrifugal pulverizing mills and crushers.

12,644 of 1903. TREATING ZINC-LEAD SULPHIDES.—Magnetic Ore Separating Company, Melbourne, Australia. Treating finely ground zinc-lead sulphides with a solution of chlorine on a table with a vanning motion, the effect being to cause the particles of zinc sulphide to adhere together, so as to be removable by mechanical means.

12,751 of 1903. ROCK DRILL SPRINGS.—J. G. Heinrich, Seattle, Wash. Improvement in the springs of internally driven reciprocating rock drills.

Week Ending August 15.

20,093 of 1902. HAULAGE SYSTEM.—C. Burnett, Durham. A system of haulage in mine shafts, there being provided additional ropes for sustaining the weight of the cages instead of the winding rope carrying the whole weight.

20,472 of 1902. BELT CONVEYER.—J. F. Cook, Johannesburg, and Fraser & Charles, London. A belt conveyer specially intended for feeding stamp mills at a predetermined rate.

8,833 of 1903. ELECTROLYTIC CELL.—Chemische Fabrik Griesheim Electron, Frankfurt, A. M., Germany. An electrolytic cell for the production of permanganate of lime or other alkaline earth metal from permanganate of potash and chlorine of the alkaline earth metal.

TO TRAVELING ENGINEERS.

A room for the exclusive use of visiting engineers is maintained at the New York office of THE ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL and making its office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers non-resident in Great Britain, the privilege of free use of the Institution offices and library at Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution and thus enjoy the advantages of temporary office accommodation in the city of London.

PERSONAL.

Mining and metallurgical engineers are invited to keep THE JOURNAL informed of their movements and appointments.

Mr. H. V. Winchell is in New York.

Mr. Henry P. Lowe is now at Denver.

Mr. Henry E. Knox is at Charlotte, N. C.

Mr. Courtenay De Kalb is at Mojave, Cal.

Mr. E. M. Rogers, of New York, is at Denver.

Capt. Murdoch Wiley is now at Salisbury, N. C.

Mr. Richard A. Parker is at Saranac Lake, N. Y.

Mr. Paul Johnson has been on a visit to Nelson, B. C.

Mr. John B. Farish has left New York, and is en route to Mexico.

Mr. George Mitchell, of Los Angeles, is in New York.

Mr. W. R. Ingalls has returned to Boston from Kansas.

Mr. John Harvey, of Leadville, Colo., is in New York City.

Mr. Edward H. Liveing is expected in London from Kalgoorlie.

Mr. L. Parry has arrived in London from St. Petersburg.

Mr. Ben B. Lawrence has returned from York Harbor, Maine.

Mr. J. Parke Channing has returned from the Lake Superior region.

Mr. W. Pellew-Harvey has reached London after a journey in Algeria.

Mr. Stanley N. Rodda sailed from London on August 29 for Cape Town.

Mr. W. B. Brooks, of Chihuahua, Mex., is at the Santa Rosalia hot springs.

Mr. T. E. Schwarz, of Denver, has left for southern Mexico on professional work.

Capt. John Treweek, of Salt Lake City, has sailed for London per the *Carpathia*.

Mr. W. G. Rennie will reach New York by the *Etruria*, arriving on September 5.

Mr. W. B. McLeod has arrived in Los Angeles, Cal., from Cananea, Sonora, Mex.

Mr. Thomas W. Jaycox, of Leadville, Colo., has been appointed deputy state engineer.

Mr. Chas. Guestler has gone to Troy to examine water powers in Albany county, N. Y.

Mr. Charles M. Dobson, of New York, is in Coahuila, Mex., examining mining properties.

Mr. Henry Bratnober is expected soon at San Francisco from the Tanana river district, Alaska.

Mr. S. S. Sorensen is metallurgist to the Utah Consolidated Mining Company at Murray, Utah.

Mr. C. Bruckhold is now manager of the mines at San Andreas de la Sierra, in Durango, Mex.

Mr. Ernest Levy, of Denver, has been examining the Bear Butte district, near Galena, S. Dak.

Mr. W. D. Church has arrived at Republic, Wash., to assume management of the Tom Thumb mine.

Mr. Frank R. Davis is in charge of the new cyanide plant at the Ingham property, Cripple Creek, Colo.

Mr. W. H. Kinnon, of Denver, is at Milford, Utah, to superintend the starting of the Majestic smelter.

Mr. E. R. Hurd, of West Superior, Wis., was at Portland, Ore., recently, en route to San Francisco.

Mr. B. B. Thayer has returned to Santa Rita, N. Mex., after a business trip to New York and Boston.

Prof. James F. Kemp has returned from the west, and is now at Silver Bay, on Lake George, N. Y.

Mr. R. H. Britt, manager of the Poorman mine, Silver City, Ida., has returned from a trip to London.

Mr. George Roberts, director of the United States mint at Washington, was in New York City, August 28.

Manager G. D. B. Turner, of the J. I. C. mine at Park City, Utah, has returned from a trip to Scotland.

Mr. Albert Ladd Colby has resigned as consulting and metallurgical engineer at the Bethlehem Steel Works.

Capt. P. O'Dwyer, Colorado representative of the Empire Zinc Company, left Leadville last week for Mexico.

Mr. R. R. Bowles, of Leadville, Colo., who has been in New York and Massachusetts for some weeks, has returned.

Mr. C. H. Herzig has arrived at Orange, N. S. W., to take the management of the Mount Bulga Copper Company.

Dr. L. D. Godshall, formerly of Encampment, Wyo., is now at Denver with the North American Exploration Company.

Mr. O. E. Lee, manager of the Dexter mine at Tuscarora, Nev., recently returned to Salt Lake City from the east.

Mr. T. Worth Bowen, formerly superintendent of the Centennial mine at Georgetown, Colo., was in Denver recently.

Herr Dos, mine manager to the Prince of Donnersmarck, is visiting the mining and smelting establishments of this country.

Mr. F. W. Bradley, of San Francisco, Cal., president of the Bunker Hill & Sullivan Mining Company, has been at Wardner, Ida.

Mr. William R. Todd, president of the Quincy Mining Company, and Mr. G. M. Hyams, of Boston, have been in Houghton, Mich.

Mr. Charles S. Smith, of Boston, president of the Old Dominion Copper Mining and Smelting Company, has been visiting Globe, Ariz.

Mr. E. W. Sebben, consulting engineer of the Dexter Mining and Development Company, has returned to Denver from Atlantic City, Wyo.

Mr. L. E. Hill, general manager of the Golden Cycle Mining Company, has arrived at Colorado Springs from a month's trip through the east.

Mr. H. Y. Russell, for some time with the Revenue Mining Company, has resigned to take charge at the Treasury tunnel near Silverton, Colo.

Mr. Leo Von Rosenberg has been in Maryland and West Virginia. He has removed his office from 35 Broadway to 170 Broadway, New York.

Mr. George H. Robinson, of Salt Lake, Utah, and President Henry Stern, of the Tintic Company, have left for a trip through British Columbia.

Mr. E. A. H. Tays is consulting engineer to mines in Sinaloa, Mex. During September and part of October he will be at Guadalajara, in Jalisco.

Mr. John A. Kirby, general superintendent of the Daly West of Park City, Utah, has left for Seattle and other cities on Puget Sound on a vacation.

Mr. W. D. Pearce, general manager of the La Luz Gold Mining Company, has returned to Chihuahua from a trip to Louisville, Ky., and California.

Mr. W. A. Braiden, president of the Cashier Mining Company, spent a week at Anchor, Taos county, N. Mex., recently, inspecting mining properties.

Mr. George F. Waddell, superintendent of the mechanical department of the Washoe smelter, Anaconda, Mont., has gone to Nova Scotia, for a short visit.

Mr. John Fogarty, formerly superintendent of the Emma mine near Butte, Mont., has gone to Frank, Alberta, to take charge of the coal mine at that place.

Capt. Gustave Anderson, who has had underground charge at the Ashland mine, at Ironwood, Mich., is now in charge of the Negaunee mine, Negaunee, Mich.

Mr. Irving A. Chandler, of the Engineering Company of America, went to Copper Cliff, Ontario, on September 3, to superintend the erection of a smelter.

Mr. H. L. Ross, engineer of the American Mexican Mining and Development Company, has left the States for the company's mines at Velardeña, in Durango, Mex.

Mr. Willard F. Snyder, president and general manager of the Western Exploration Company, has returned to Salt Lake City after a three weeks' trip to California.

Mr. Earl W. Walton has been appointed superintendent of the Sunday Lake and Brotherton mines, Gogebic range, Mich., to succeed Capt. Ned B. Roscorla, resigned.

Mr. George B. Lee, superintendent of the new smelter at Douglas, Ariz., of Phelps, Dodge & Company, has been at Grand Forks, B. C., investigating smelting methods.

Mr. James F. Hyslop, manager of the Parral Mining Company, Parral, Mex., is to be manager of the San Francisco del Oro Mining Company, operating in the El Oro district.

Mr. Thomas H. Martin, lately with Corrigan, McKinney & Co., at Crystal Falls, Mich., is to manage an iron mine the Iroquois Mining Company is developing at Baraboo, Wis.

Mr. William Gray, manager of the Velvet mine, Rossland, B. C., is to return to London to consult with the directors of the Velvet regarding a resumption of work in October.

Mr. A. D. Ferron, engineer for the Raven Mining Company, has gone to the company's camp in the Uintah reservation, while Judge Homan, general manager, has gone to Chicago.

Prof. George R. Finlay, late of Columbia University, succeeds Prof. F. W. Cragin, resigned, as the head of the department of geology at Colorado College, Colorado Springs, Colo.

Mr. James Earls is now superintendent of the Bullion-Beck Mining Company, Eureka, Utah, succeeding Mr. J. D. Murphy, resigned. Mr. Earls was formerly superintendent of the Mammoth.

Mr. J. E. Harwell has resigned as engineer at the Santa Rita concentrator, Santa Rita, N. Mex., and has gone to Cananea, Mex., to enter the employ of the Cananea Consolidated Copper Company.

Dr. Charles S. Palmer, former president of the Colorado School of Mines, has accepted the position of chemist at the Anaconda smelting works of the Amalgamated Copper Company, Montana.

Prof. George H. Rowe, dean of the faculty of the engineering department of the University of Colorado, has left for Stanford University at Palo Alto, Cal., to accept a position in the engineering department.

Mr. Morris W. Lee, late advertising manager for Joseph T. Ryerson & Son, Chicago, has accepted a position with the Lanyon Zinc Company, as assistant to the superintendent of its works at Iola, Kan.

Mr. Ellis W. Honeyman has resigned his position with the Ducktown Sulphur Copper and Iron Company, at Ducktown, Tenn., and is now chemist with the Detroit Copper Mining Company, at Morenci, Ariz.

Mr. F. G. Coggin is now superintendent of the Champion mill at Houghton, Mich. Mr. Coggin's relations with the Atlantic and Baltic mills, of which he is superintendent, are in no way affected by the new conditions.

Mr. D. R. Williams has resigned as superintendent of the Belmont Company's Park City property to accept a like position at the Butler Liberal Company, at Bingham, Utah. Mr. Edward Corbett succeeds Mr. Williams at the Belmont.

Mr. W. A. Carlyle, manager of the Rio Tinto copper mines in Spain, and formerly of the Canadian Geological Survey, has been in Duluth, Minn., and on the Mesabi range to examine steam-shovel mines. The Rio Tinto intends to use shovels in certain of its deep open-cuts.

Manager Roscoe Channing, of the Utah Consolidated, accompanied by Mr. George K. Fisher and Mr. S. S. Sorenson, have been looking over the smelting plants of the Amalgamated Copper and other companies at Anaconda and Butte, Mont.

Mr. Allan MacLean, of London, Eng., a director of the English company that owns the Velvet mine, Rossland, B. C., left Spokane recently to join Mr. C. Williamson Milne, of the Rossland-Kootenay Company, at El Paso, Tex. Mr. MacLean was accompanied by Mr. William Thompson, manager of the Rossland-Kootenay Company.

OBITUARY.

Joseph Wilmes, superintendent of construction of the Tamarack copper mine for many years, died August 19. Mr. Wilmes spent 43 years in the Lake Superior copper region. He came to this country 46 years ago. He went to the old National mine in Ontonagon county, Mich., in 1859. Later he entered the employ of the Tamarack, and was given the position of superintendent of construction.

SOCIETIES AND TECHNICAL SCHOOLS.

AMERICAN ELECTROCHEMICAL SOCIETY.—The fourth general meeting will be held at Niagara Falls, N. Y., September 17, 18 and 19. The meeting will be held at the auditorium of the Cataract House. The afternoons of September 17 and 18 will be devoted to visits to power houses and certain of the electrochemical plants which are open to visitors and to other points of interest in the vicinity. On the evening of September 17 there will be a smoker and entertainment at the Cataract-International. The evening of September 18 a dance and reception at the

Cataract House. The evening of September 19 will be devoted to a trip to Niagara-on-the-Lake, Youngstown and Port Niagara by boat and trolley.

The following titles of papers have been announced: "A New Type of Electrolytic Cell," by P. G. Salom; "Manufacture of Ferro-Alloys in the Electric Furnace," by Dr. George P. Scholl; "Electrolytic Copper Refining," by Dr. W. D. Bancroft; "Electrometallurgy of Gold," by Dr. W. H. Walker; "Some Theoretical Considerations of Resistance Furnaces," by F. A. J. FitzGerald; "On the Supposed Electrolysis of Water Vapor," by F. Austin Lidbury; "Efficiency of the Nickel Plating Tank," by Prof. O. W. Brown; "Electrolysis of Sodium Hydroxide, by Alternating Current," by Carl Hambuechen; "A Practical Utilization of the Passive State of Iron," by Prof. C. F. Burgess; "The Present Status of the Theory of Electrolytic Dissociation," by Dr. E. F. Roeber; "Berthelot's Law of Electrochemical Action," by C. J. Reed.

Papers are also expected from Dr. J. W. Richards, David H. Browne, Dr. L. Kahlenberg, Prof. C. F. Burgess, A. H. Cowles, and others. One session of the meeting will be devoted to the discussion of the theory of electrolytic dissociation, which will be opened by Dr. W. D. Bancroft.

INDUSTRIAL.

Fraser & Chalmers, Limited, have moved their offices to 3 London Wall Buildings, London, E. C.

The Baldwin Locomotive Works, Philadelphia, has let a contract for a power house 63 by 40 ft., with a stack 125 ft. high.

The National Steel Foundry Company, of New Haven, Conn., has given orders to the Niles-Bement-Pond Company for their cranes.

The Compressed Air Machinery Company, of San Francisco, Cal., is to ship a Word drill sharpener to the St. John del Rey mine in Brazil.

Fairbanks, Morse & Company have shipped equipment to Gunnison county, Colo., for the Gothic mill, including concentrators and an Elspass mill.

The Risdon Iron Works, San Francisco, Cal., report having received an order from J. H. Leggett, of Oroville, Cal., recently, for a large gold dredger, costing $80,000. The company built a dredger for Mr. Leggett's ground about two years ago.

The Coe Brass Manufacturing Company, of Torrington, Conn., is adding to its power plant and has placed orders with the Allis-Chalmers Company for a 22 by 44 by 42 in. and a 19 by 38 by 42 in. combined horizontal and vertical compound Reynolds-Corliss engine, two air pumps and two jet condensers.

Robert K. Mackey, formerly assistant general sales agent of the Delaware & Hudson Company, is now general manager for Alexander J. McCollum, with offices in the Flatiron building, New York. The firm will do a general coal business, handling both anthracite and bituminous coal by the cargo and at retail.

A site has been selected by the Cherry Valley Iron Company of Sharon, Pa., for an additional furnace at West Middlesex. The new furnace will be 70 ft. high and 20 ft. in diameter and will cost about $500,000. The plant will be completed in November. It is expected that it will have a daily capacity of 250 tons.

The Pennsylvania Steel Company will rebuild its No. 3 blast furnace at Steelton, Pa., during the autumn. The stack has a capacity of 200 tons a day and when rebuilt will be able to produce 400 tons. The new furnace will be 84 ft. high and will be a duplicate of No. 4 furnace. The present stack was built in 1883.

The Coxey Steel and Silica Sand Company, Mount Vernon, O., has received a contract for the steel castings for 15 large gun carriages to be built by the Morgan Engineering Company of Alliance, O., and also received contract for the castings for four 24-ft. steel racks for soaking-pit furnaces for the open-hearth plant of the Lackawanna Iron and Steel Company, at Buffalo, N. Y.

The Hendrie & Bolthoff Manufacturing and Supply Company, of Denver, has completed an electric light plant for Littleton, Colo., which comprises a Chuse steam engine, two-phase electric generator, transformer and meters. Recent sales also included a Bolthoff first-motion hoist, Norwalk air compressor, boiler plant and cage with Jelenek chairs for the Katinka mine in Cripple Creek district.

The Westinghouse Electric and Manufacturing Company has secured a contract from the Peterborough Hydraulic Power Company, to build a large plant on the Otonabee river. The initial equipment will include a 1,500-kw., 2,240-volt, 60-cycle generator to operate at 750 revs. per min., and to be directly connected to water wheels; also two 125-volt, direct-current, direct-coupled exciters of 75 kw. capacity, each with switchboard.

The Oregon Electric Power Company has started work on its large plant at Sparta, Oregon, to be run by water power secured from Eagle creek. The flume, will be 5 ft. deep. Nearly 2,000,000 ft. of logs have been cut and 300,000 ft. of lumber sawed for its construction. The plant will cost $200,000 and will furnish power to Baker City, La Grande, Union, Sumpter, and the surrounding mining district. To reach all these towns will require 170 miles of wire.

The Greene Consolidated Copper Company is to build an electric railway to operate from Ronquillo, Sonora, Mex., where the miners live, to La Cananea, where the company's mines, smelting plant, etc., are located. The distance is about two and a half miles. Power will be derived from the company's electric generating plant, just completed. The capacity of the plant exceeds 2,000-h.p. The engines were built by the Union Iron Works, San Francisco. The generators were made by the General Electric Company.

The Providence Steel Casting Company will have a foundry in Providence, R. I. The main foundry will be 150 by 118 ft. An electric traveling crane of 10 tons capacity and 50-ft. span will be installed. All the machinery will be operated by independent electric motors. The power house will be equipped with a high pressure compound engine of 250-h.p. direct connected to an electric generator of 160-k.w. The output of the plant will be mainly small and medium weight castings made by the Tropenas process. The officers are: Darwin Almy, president; F. W. Hartwell, vice-president; J. C. Hartwell, secretary, and E. M. Shaw, treasurer.

TRADE CATALOGUES.

The Pratt & Whitney Company, of Hartford, Conn., issues a neatly illustrated pamphlet of 182 pages, describing its small tools of standard gauges. The company manufactures taps and dies of many patterns, including Echols', Burritt's and Brigg's taps, and Woodbridge, Grant and New Model dies. The company's taps, dies and die-stocks are made in all sizes. The company also makes milling cutters, double-angle cutters, metal slitting cutters, besides reamers, drills, punches, etc.

The Allis-Chalmers Company, of Chicago, Ill., in its catalogue No. 11, the fifth edition of which has just been issued, describes the Tremain steam stamp mill. The company states that this mill has been designed especially to meet the needs of people having mining properties in the first stages of development, enabling them to establish a good crushing, amalgamating or concentrating plant of moderate capacity, in the shortest possible time, with least material and for the least money. In the mill the two stamp stems terminate at the upper end in pistons working in cast-iron steam cylinders. The stamps weigh 300 lb. each. The pistons by the valve mechanism give alternate strokes and use steam expansively, so that, as the company states, it is possible to get as heavy a blow upon the die as with a gravity stamp weighing 800 to 1,000 lb. dropping 8 in. The machine is complete in itself, weighs but 3,300 lb., and, being built entirely upon the mortar requires no framework other than the substantial mortar block. The steam power required is stated to be from 7 to 10 h. p.

The Blaisdell Company, of Los Angeles, Cal., and the H. W. Blaisdell Company, Limited, London, Eng., and Johannesburg, South Africa, have issued their catalogue B, describing the cyanide vat machinery which it manufactures under the patents of H. W. Blaisdell, the machinery being designed for mechanically handling sands and slimes in cyanide treatment. The catalogue is of standard size, 6 by 9 in., and contains brief descriptions of the Blaisdell cyanide vat excavators, distributors, aerators and mixers, with half-tone illustrations of the machines, and also seven plates showing the general arrangement of plants for the different methods of sands treatment by Blaisdell labor-saving devices. These include installations for the El Oro Mining and Railway Company, Limited, El Oro, Mex.; Gold Road Engineering and Exploration Company, Acme, Ariz., and Chas. Butters & Company, Limited, Virginia City, Nev. The makers state that by the use of their machinery it is possible to handle the sands from the mill to the dump without the use of a shovel and one man can handle 100 tons per hour for about $1, gold. The catalogue should interest all having to do with the cyanide process.

SPECIAL CORRESPONDENCE.

Butte. Aug. 29.

(From Our Special Correspondent.)

Nothing is announced regarding the resumption of mining by the Anaconda and Washoe copper companies, although the work of making the flue connections at the new Washoe smelter is pushed night and day with double pay for overtime and Sundays. The outlook for an early resumption at Philipsburg, at the property of the Granite-Bimetallic, is not very encouraging; a few men only are employed about the works. Considerable material and machinery that in any event would be useless to the company is being sold by the receiver.

There is a complete close down at Pony, at the mines of the Clipper group, bought two years ago by interests supposed to be closely identified with the Amalgamated Copper Company. The reason is not given out. The 100-stamp mill, which was placed on the property at the time of the purchase, has not been completed, presumably because the mill was found to be not suited to the ore. Some 4,000 tons of ore have been mined and shipped to the smelters at Butte and Anaconda since last winter.

The attachment on the property of the Watseka Gold Mining Company, at Rochester, for $120,000 by F. Aug. Heinze and Geo. H. Robinson, acting for the State Savings Bank of Butte, created a mild sensation, as it was presumed that the company was making money. The attachment will not cause the closing of the mines, as that would cause an irreparable injury to the property, owing to the excessive amount of water to be handled. It is understood that the ore shoot where cut on the new 600-ft. level has opened out larger and of better grade than in the level above.

Three gold dredgers are working at the lower part of old Alder Gulch, one of which, the *Mollie Gibson*, is operating on leased ground. This lease will expire this season, and as it is not to be renewed, that boat is offered for sale to be moved elsewhere. The boat on French gulch is also in operation, working in ground that is making a satisfactory recovery. The two boats at the old camp of Bannock are idle this season, owing to the ground being exhausted. These will be removed to some new location when found.

Surveyors are in the field, running a line for an electric railroad from Redrock, Mont., to Salmon City, Idaho, a distance of about 70 miles, crossing the main continental divide. The Lewiston extension of the Montana Railroad is within 15 miles of Lewiston. This line will probably be completed and in operation before Christmas and is the only line so far to penetrate Fergus county.

Another project is on foot to dam the Missouri river for power purposes. The site of the new dam is in the vicinity of the town of Craig, which would be about midway between the dam at Canyon Ferry and Great Falls, or just below the canyon of the Missouri. The Missouri River Power Company, whose plant is at Canyon Ferry, is taxed to about its capacity. The real interest behind the new dam scheme is not known to your correspondent, but that additional power can be utilized at certain seasons of the year by the Boston & Montana Works at Great Falls is apparent, those works at times being compelled to resort to steam, having a 2,500 h. p. battery of boilers for that purpose.

By changes in the staff of the Amalgamated Copper Company, B. H. Dunshee is now assistant superintendent and J. C. Adams is superintendent, Boston & Montana properties; George Moulthrope is foreman of the Pennsylvania mine. General superintendent John Gillie is at present visiting his old home in Michigan.

Denver. Aug. 29.

(From Our Special Correspondent.)

The Telluride mill at Colorado City is reported sold to the General Metals Company, recently organized in New York. The purchasers propose to use the bromine process on a large scale at this mill and also at new mills to be erected in other gold bearing districts throughout America, subject to tonnage royalty to the Telluride Reduction Company owning the patents. The Telluride mill was built by the reduction company about 18 months ago, at a cost, including the later addition, of about $500,000. It was originally intended as a sampler, experimenting with the bromine process and its success resulted in the company trebling the capacity last spring.

The seeds of discord sown by the agitators dominating the Western Federation of Miners continue to yield a harmful harvest for the metaliferous mining industry of this State. It is now nearly two months since the smeltermen were called out at two of the plants in Denver. The Globe smelter has been in partial operation two weeks. President Moyer and secretary Haywood, of the Western Federation of Miners, previous to the strike, imbued the smeltermen with the belief that if they walked out to force the eight-hour issue on the American Smelting and Refining Company, the smeltermen of the same company in other parts of the State would likewise quit, thus tieing up the whole mining industry of Colorado. Since the abortive efforts to enlist strikers in the Leadville and Pueblo plants, nothing has been accomplished at either of those places.

Notices were posted yesterday at Durango calling on the smelter employes of the American Smelting and Refining Company at that place to strike to-day. In presenting the demand for an eight-hour day to Mr. Daniel McLean, the manager, the spokesman stated that the non-union men joined with the union

men in the request. Mr. McLean then asked if the non-union men were represented on the committee waiting on him and if all members of the committee were working at the smelter. Reply being given in the negative, Mr. McLean said that he could not deal with the committee, or the union, but was perfectly willing to grant the men employed at the smelter a conference and take up any grievance they might present. There is a Citizens' Alliance at Durango, and as the non-union employes outnumber the union men, it is thought by some that the plant will be able to run, as the Alliance has guaranteed protection to men who desire to work. So far no demands have been made for an eight-hour day in San Juan county which is the main source of ore supply for the Durango smelter, but it is expected shortly.

The third week of the sympathetic strike in the Cripple Creek district finds some changes. When President Burns, of the Portland Gold Mining Company, less than two weeks ago had the carpenters nail up the shafthouse of that mine, he remarked that every spike was a nail in the coffin of the Federation. He subsequently suddenly changed his mind. He has never acted in concert with the local mine owners, and now has made some kind of an arrangement with the union under which the Portland mine has been re-opened and the union officials took care not to be too exacting.

On August 27 the Eagle sampler at Cripple Creek started and nearly all the old employes reported for work. Three carloads of ore from the El Paso mine were put through. A committee from the union waited on the railroad men, switchmen, conductors and engineers, requesting them not to handle the ore, but the railroad men referred the committee to the headquarters of their respective organizations. The ore was billed to a Denver smelter. The merchants of Cripple Creek met on August 27 and organized an alliance to combat the influence of local unions.

At Colorado City, on August 25, the local Mill and Smelter men's Union declared a strike on the Telluride mill, calling out almost every one of the 140 employes, closing down the plant and antagonizing the Telluride Reduction Company, which, up to date, has granted every demand of the union, paying $2.25 minimum wage. During the strike at the three local mills last spring, the Telluride Company so favored the union as to incur the slightly veiled hostility of many mine owners of the Cripple Creek district. The direct cause of the strike was an altercation between the management and union employes as to the retention of a non-union employee, whom the union charged with being responsible for abuses that might be charged to members of the union. The non-union man in question was assaulted by a union man and immediately resigned, despite manager Fullarton's request. Mr. Fullarton then informed the union, in writing, that any further dictation on its part would result in the discharge of every union man in his employ, and also demanded the discharge of the union man who had committed the assault. After an unfruitful conference in Mr. Fullarton's office, the executive committee of the union declared the strike. Mr. Fullarton asserts that he will run the mill, either with union or non-union men.

Trouble is apparently pending in San Miguel county. On August 22 the Telluride Miners' Union (of which the president, St. John, is a fugitive from justice) requested the Telluride Mine Owners' Association to grant an eight-hour day to all mill men on and after September 1. A committee from the association conferred with a committee from the union on August 25. The union demanded an eight-hour day for all classes of employes in and out of the mines, all of whom, except the mill men, are included in an agreement, dated November 28, 1901, between the local miners' union and the local Mine Owners' Association which has over a year to run. The wage scale demanded, in all but a few instances, proposed no reduction whatever for an eight-hour day from the wages now paid for 9, 10 and 12 hours' work. The mine owners declined to consider the proposal as involving a direct violation of the existing agreement and further stated that under no conditions would it be possible for the mining companies to grant the hours, wages and general conditions demanded. The union demanded that at all mills and cyanide plants men be compelled to join the union by September 1; also that the secretary of the union be allowed to go through the mills, to solicit membership and collect dues at any and all hours. Present indications are that a strike will be declared on September 1, chiefly a sympathetic one against the American Smelting and Refining Company, and the mining companies around Telluride are preparing for an indefinite shutdown. As the mines are mostly working through tunnels the question of pumping is not involved.

BY TELEGRAPH.

The situation is little changed at Cripple Creek. Some men were put to work in the Ajax on September 1. The Golden Cycle is expected to start soon. The drainage tunnel is completed to the El Paso mine. The Eagle sampler is running part of the time. It is reported that there is a movement among the miners to start a new union belonging to the American Federation of Labor, but nothing definite is done yet.

San Francisco. Aug. 26.

(From Our Special Correspondent.)

The conference at Los Angeles between the Desert Mine Operators' Association and the president of the Randsburg Miners' Union, came to nothing. The mine operators refused to pay more than the old scale of $3.50 per day for shaft sinking, and $3 for stoping and drifting. The Miners' Union asked for $3.50 per day for all miners, and $3 for shovelers. The principal place affected is the Randsburg region, but all other "desert" districts are interested. Most of the mines at Randsburg and Johannesburg have been closed for some time owing to the strike. It is apparent that the new Mine Operators' Association intends to force an issue with the miners. The Yellow Aster Mining Company, at Randsburg, the largest employer of labor in the region, is idle still. It has now, however, 60 non-union miners on the way to Randsburg from Missouri and will have 200 before long. The result of this move remains to be seen, but some trouble will doubtless grow out of it. If this is to be the policy of the Desert Mine Operators' Association, labor troubles may be expected in several camps in southern California and southwestern Nevada, where this association has jurisdiction.

When the strike trouble occurred at the mines and smelters of the Mountain Copper Company in Shasta county, manager Wright was compelled to bring in outside men and won out, though the smelters were practically closed for months. The Yellow Aster bears the same relation to the mines of Kern county that the Mountain Copper Company does to Shasta. The latter is now running full handed, though it has another trouble on its hands in the matter of injury to vegetation by smelter fumes. Mr. J. K. Haywood, an expert from the Department of Agriculture at Washington, has been investigating this subject and will report to the Government. The company bought large tracts of land, but has been more or less bothered by suits for damages brought by orchardists and farmers. Now the Government is looking after possible damages to timber tracts.

The Mountain Copper Company has taken to the use of oil for fuel on the locomotives of its railroad, and thus closes the use of wood as fuel. It formerly used 20,000 cords a year. It now uses electrical power instead of steam and has abandoned the open-air roasting of ores. About 100 woodchoppers are out of a job.

Another non-assessable mining company has come to grief and quit work. This was the Grass Valley Consolidated Mining Company of Nevada county, which reopened an old mine. The stock was made non-assessable that it might be more readily sold when more money was required. No assessments could be levied, though several of the stockholders were willing to assess themselves. So they had to quit and let the mine pass into other hands. The non-assessable feature is attractive to people who buy stock and numbers of companies incorporate in other States to evade the California laws, though the California courts have decided that the debts of a company must be paid anyhow by the stockholders. Many of the non-assessment companies are organized to work mines only held under a bond and this makes matters worse when no assessment can be levied. It has lately been found that the California code holds original owners liable for debts contracted by such companies, so that there is not now the freedom in bonding claims that there was formerly.

Comment was recently made on the action of the owners of the Blue Point mine in Yuba county in asking the Anti-Debris Association not to interfere in certain proposed hydraulicking. The Anti-Debris Association has since held a meeting at which representatives of the company appeared and asked permission to hydraulic off an old slide, some 700,000 yds., so that pay dirt can be reached. The association took the matter under advisement. The mine when worked by hydraulicking dumped into the Yuba river.

The Golden Star Company in Sierra county is a Chinese outfit having a mine next to the Corotoman mine, the owners of which have sued the Chinamen for drifting out about $10,000 worth of gravel.

Between the Empire Mines Company and the Empire West Company a number of properties at Grass Valley have been consolidated and absorbed. The same man is president of both companies. The latest purchase of the Empire West is the Menlo and Omaha properties, which include a number of different claims. The properties will now be worked on a more extensive scale than formerly.

The numerous mines owned by the estate of the late Patrick Reddy in Inyo and Mono counties are to be disposed of by order of the probate court. The principal mines are those of the Darwin group at Darwin, Inyo county, valued at about $100,000, but there are numerous other mines in that and Mono county which may be purchased. They have all been idle since Mr. Reddy's death.

Spokane. Aug. 28.

(From Our Special Correspondent.)

The Tacoma Smelting Company, which is owned by the Bunker Hill & Sullivan, the Alaska Treadwell, the Alaska-Mexican and the Alaska-United companies—in all of which the D. O. Mills interests have holdings—has been put in fine shape, and since January 1 has been paying quarterly dividends of 2½ per cent. In addition it has paid for all of the improvements, and has a working capital of about $300,000 to buy ores. About $400,000 has been put into the smelter since it was taken over by the Mills' interests, four years ago. It was then badly run down.

The Bunker Hill & Sullivan mine is reported opening a fine new ore body in the Bunker Hill at a depth of about 900 ft., midway between the Reed and the Kellogg tunnel levels. It has been drifted upon for 300 ft. and is reported of the usual grade, running about ½ oz. in silver to 1 per cent. in lead. There is believed to be little doubt that the shoot will extend down to the Kellogg tunnel, 450 ft. below, as the Stemwinder shoot, which lies close to the Bunker Hill shoot, has been opened on the tunnel level. A large force of men is stoping on the Stemwinder shoot, the decision of the lower courts having given that ground to the Bunker Hill Company. The Bunker Hill is working about 400 men and is shipping 3,000 tons of concentrates a month. Stanley Easton is manager of the mine.

Charles Sweeny, president of the recently projected Federal Mining and Smelting Company, which proposes to take over some of the Coeur d'Alene silver-lead mines, has been in Spokane with John D. Rockefeller, Jr., and visited the Wallace and Wardner mines. Mr. Sweeny declared that the formation of the new Federal company is completed with the following directors: F. T. Gates, of New York, general manager for John D. Rockefeller; George J. Gould, John D. Rockefeller, Jr., W. C. Butler, former manager of the Everett smelter; Charles Sweeny, Edwin Packard, now president of the Empire State-Idaho Company; John A. Finch, of Spokane, representing the Standard Company; George W. Young, of New York, president of the United States Mortgage and Trust Company; C. D. Warren, president of the Traders' Bank of Toronto; E. J. Barney, of Dayton O.; Peter Bradley, of New York City, and Horace J. Knowles, of Delaware, where the new company is incorporated. General offices will be in Spokane, the head offices in New York. The nominal capital of the new company is $30,000,000, of which $20,000,000 is in 7 per cent. preferred stock and $10,000,000 is in common stock.

Victoria, B. C. Aug. 25.

(From Our Special Correspondent.)

For the first time this year the mining industry in British Columbia is free from labor troubles. The miners' union at the Cumberland collieries have decided to accept the operators' offer and return to work, and have furthermore signed a contract that gives them the option of leaving the company's employment individually, but provides that for a period of two years the union will not endeavor to enforce a strike. The small labor trouble on Texada Island, where the union attempted to get hours shortened and pay increased, has been settled, at the advice of the local executive of the Western Federation of Miners, the miners' demands having been withdrawn. Conditions generally on Vancouver Island and the coast are promising, and production, especially from the Mount Sicker district, is heavier than ever. The Lenora mine is now being operated in the interests of creditors under capable management, and 100 tons of ore a day are shipped to the Crofton smelter. An important strike of bornite is reported, the values in gold and copper being exceptionally high. The Crofton smelter is treating about 400 tons of ore daily, the supply coming not only from coast mines, but from as far inland as Kamloops, B. C., and Republic, Wash.

Returns from the territorial comptroller's office show the value of gold won in the Yukon so far this season is but $300,000 less than that reported for 1902. Considering that operations have been hampered by water shortage this is a satisfactory showing. The returns from Dawson are: May, $173,781; June, $3,324,480; July, $2,015,586. Gold exports from White Horse in May were $246, and $2,370 in June. In Atlin some very satisfactory clean-ups have recently been made, particularly by the Atlin Mining Company. More attention is given quartz mining, and crushing has begun at the Yellow Jacket mine on Pine creek. T. G. Blackstock, vice-president of the War Eagle and Central Star Companies, of Rossland, is reported to have said recently that as a result of tests made for two years he is satisfied that the company can treat at a profit ores showing a smelter's gross assay value as low as $5 per ton, and that the directors have decided to erect a 200-ton mill to treat War Eagle and Centre Star ores by a process combining concentration and cyaniding.

The Copper King mine, at Kamloops, has shipped a first car-load of ore for smelter treatment to the Crof-

ton works. The mine has been systematically developed for three years, and now has considerable ore-reserves.

It is reported that the high-grade ore chute to the northeast of the main shaft of the Le Roi, locally known as the Peyton vein, has again been encountered at the 150-ft. level, after some months of work. Meanwhile, thanks to an improvement in coke supply, the four furnaces at the Northport smelter are in operation.

George H. Barnhart, formerly superintendent of the Ymir mine, has taken a lease on the Porto Rico, a property owned by British and French capital. It is equipped with a 7-drill compressor and a 10-stamp mill, the ore being a free-milling quartz carrying fair values. Operations were abandoned in 1899, after mining all the ore in the upper levels. No attempt has since been made to reopen the mine.

Two strikes are reported this week—one at Salmo, of a rich quartz lead, and the other near Cooper creek, a stream running into the Lardeau river, about 20 miles east of Poplar creek. The country through which the creek runs is described as very rough. Glaciers and bare slopes of rock are plentiful. A discovery of coal is reported made near Coldwater creek, in the Nicola, and a number of claims have been located.

Work on the Council & Salmon River Railroad is progressing and 5 miles of track are reported laid. The rolling stock is on the ground. The company constructing this railroad is employing 500 men and is pushing work to complete 20 miles of track this season.

An increasing demand for mining machinery is noticeable. Hardly a week passes without one or more important installations made. Last week five carloads of machinery were taken into the Lardeau, and stamp mills and concentrators have been or are to be ordered for half a dozen other properties there. There have probably been more mills erected this year in British Columbia than ever before.

An effort is being made by the New Fairview Corporation, operating the Stemwinder mine at Fairview, to raise $125,000 by an issue of 8 per cent cumulative preference stock. A large proportion of this amount has already been subscribed for by men in eastern Canada already heavily interested in the undertaking. It is to be hoped that the shareholders will insist on the appointment of a competent and experienced engineer to take charge of affairs henceforward.

San Luis Potosi. August 25.

(From Our Special Correspondent.)

The Mexican Government has stated that the recent loan of $12,500,000 gold, obtained in New York by Finance Minister Limantour, is for raising funds for the Tehuantepec National Railroad; for improving the ports of Coatzacoalcos, Salina Cruz, Manzanillo, Vera Cruz and Tampico, and for improvements in the City of Mexico.

The Torreon smelter and the Monterey plant of the American Smelting and Refining Company are diverting some of their ores, the one to the other, to their mutual advantage, and in several instances the San Luis Potosi plant of the Compania Metallurgica Mexicana has refused to bid against the American Smelting and Refining Company, receiving as a consideration a part of the ores on the latter's contract. The labor troubles at the plant at San Luis Potosi are now regarded as at an end. The company has seven furnaces in blast.

From Lower California comes the report that near La Paz a large gold nugget has been found. There are on the peninsula immense placers, but there is little water and it must be brought long distances. At Triumfo, near La Paz, a great deal of work is being carried on. The labor troubles do not seem to be as great as reported, and the Boleo Copper Company has managed to produce for the first six months of this year 5,202 tons of copper, as against 4,861 tons in the same time last year. Large deposits of borax are being found on the peninsula, though they are not yet of commercial value, lacking transportation.

In Tepic at the Mina Mexicana, of Yesca, Ahuacatlan, work has shown so much ore, that pumps and an entire new plant of machinery have been ordered. At the Espiritu Santo mines, the new work has developed great ore bodies at the water level, and the camp of Compostela is taking on new life. Plans are being formulated to drive a drainage tunnel, at a cost of some $750,000, Mexican, to tap the principal mines at a depth of about 1,000 ft., with several mills, or a large union mill, at the mouth of the tunnel. In Jalisco, the Tula Iron Works, of New Jersey, capitalized at $4,000,000 gold, with R. H. Beach as manager, is developing large tracts near Sayula, 60 miles southwest of Guadalajara. A Tucson company has purchased and is operating what is said to be a 10 per cent copper property near Las Salas station. Las Moras Mining Company, is planning a concentration plant, and possibly a smelter, at Ameca. The Tlalpa Mining Company is buying new equipment for its properties at Tlalpa. Negotiations are on between Sebastian Ipez and a Canadian company for the former's holdings near Trueno, Jalisco.

At present in Sonora are two lawsuits in the Cananea district, one the Indiana-Sonora Company over the Cerro de Cobre, and the other between Messrs. Mitchell and Greene over stock claimed to be due Mitchell in the Greene Consolidated Copper Company. The Ures Consolidated Mining Company, besides the Eureka, with which it started two years ago, has now 12 good mines, on two of which it has spent over $100,000 Mexican, and is rewarded by a large body of $12 ore. The mine is well equipped with hoist, boilers, houses, homes and shops. The French company operating at San Jose, a few miles south of Churinibabi, has its mill and hoist erected and 100 men at work, and has been fortunate enough to develop a 12 in. vein of $30 to $40 ore. The Sonora Mining and Milling Company, of Tubutano, has ordered $100,000 Mexican of new machinery. Rich strikes are reported from the Moctezuma district, and include one of good copper ore in the Santa Rosa.

Exchange on New York continued downward last week, selling Saturday at 224, but to-day is down to 220. A mining exchange has been organized with a capitalization of $200,000 Mexican, being 400 shares of $500 par value. The favorite stocks for the week were Jupiter at $27; Bessie at $20; Old Abe, $65; Union, El Oro, $160; La Paz, Matehuala, $740; Progreso, Tlalpujahua, $58; Candalaria de Pinos, $200; Chihuahua, El Oro, $60; Aldebaran, $180; Noche Buena, $60; Providencia, San Felipe, Guanajuato, $135; Santa Rosa, El Oro, $63; Colon, $25; San Rafael, $1,420; Santa Gertrudis, $90½; Angustias, $115; Luz de Borda, $176; Aurora, $44; Sorpresa, $335, and Amistad y Concordia, $90.

London. Aug. 22.

(From Our Special Correspondent.)

A week or two ago I mentioned that there had been a remarkable incident in connection with the directorate of the Associated Northern Blocks, which is an offshoot of the Associated Gold Mines of West Australia, Limited. Taking advantage of an unusual provision in the articles of association, four of the directors voted the remaining director, Mr. Herman Landau, who was also chairman, off the board. At the time the shareholders and the public were kept entirely in the dark as to the cause of this sudden revolution, and Mr. Landau publicly stated that he had not the remotest idea as to why he should receive such treatment. As I mentioned at the time, the real reason was that while Mr. Landau was in control he had all the speculative benefits himself and the other directors did not have a chance of sharing in the results of the manipulation of the mine and the market. The incident has had the excellent effect of precipitating the reorganization of the business of the company on legitimate lines. Many of the leading shareholders joined to bring pressure to bear on the victorious board, for it was felt that the shareholders' interests would no more be considered under the new control than when Mr. Landau was at the head. The new controllers found that it was impossible to go on in the same way and were obliged to yield to the proposition that the management of the mine should be placed in the hands of Bewick, Moreing & Co., and that the board should be strengthened by the addition of Mr. J. H. Curle and Sir Bartle Frere. Thus happily has been effected one more reform in West Australian mining. The new managers will have no easy task to place the mine on a decent footing, for, as in the case of Lake View, the rich shoot has been gutted and the ore picked out extravagantly treated. In Mr. Landau's time the policy pursued was to drive levels ridiculously close together in order to cut the rich shoot and then announce a new and valuable strike. In connection with this reorganization of the management and direction of the company, it is interesting to note that Mr. J. H. Curle has joined the board. This is the first occasion that Mr. Curle has undertaken such duties and his shrewd judgment and high character should be of value to the shareholders.

The article that appeared in the JOURNAL on June 6 criticising the report by Mr. Farrell on the copper properties of the Tanganyika Concessions had no effect on Mr. Farrell himself, for he has just issued another report, dated August 10, in which he practically reiterates all his previous statements and claims. He states that the developments show the presence of high grade (average 15 per cent.) carbonate ores to a depth of 100 ft. and that there is no trace of sulphide. He is indignant at the proposal that the mine should be properly sampled and says that it is only gold mines that require close sampling. With all due respect, I would point out that more than one individual called "an eminent American engineer" has mistaken stained rock for payable copper carbonates and exhibited samples of such to the London public. To my knowledge, these gentlemen have objected to sampling as unnecessary, as the "ore" was visible to the eye in bulk. There is another difficulty (the existence of which Mr. Farrell admits in his last report), viz: that some way will have to be devised of separating the silica from the carbonates. Presumably there is no iron for slagging off, nor are there any sulphides with which to make acid for leaching. He therefore recommends that the bunches of carbonate should be hand picked at the workings. In the meantime the project of the Tanganyika Concessions and the Zambesia Exploring Companies to acquire the Lobito Bay Railway concession from the Portuguese government has fallen through, owing to Mr. Christopher Leyland withdrawing from his underwriting contract. The scheme was a big one, involving the issue of £4,000,000 debentures. The failure to carry it through had nothing to do with the nature of the mining concessions, but it must seriously interfere with the proving of them.

The shares in the Nimrod Syndicate, a promoting company with interests in both North and South America, have been the victims of many attacks during the last few weeks and the quotation has been depressed from £7 to £1. It is only natural that an impression should gain ground that the holdings and speculations of the syndicate have suddenly collapsed. However, the real reason for the fall is the failure on the Stock Exchange of Mr. Frederick Lowry, who was one of the largest shareholders and practically the controller of the operations of the syndicate. Rumors were circulated that one of the enterprises of the syndicate, the Chimbote Coal and Railway Company of Peru had been abandoned because the coal was proved to be of poor quality, and the bears used the rumor to make wild attacks on the shares. I find that the reports as to the quality of the coal have some foundation, for the ash is high, but this is not sufficient to cause such a depression of the shares as the syndicate has many other holdings. The syndicate was formed four years ago by Mr. Lowry and another firm of stockbrokers, and at first attention was centered on British Columbia, Atlin and Klondike. Chiefly, I believe, because the directors did not follow closely enough the advice of their mining engineers, these enterprises did not turn out well. Later the Chuquitambo gold mines, in Peru, were acquired, and under the management of Mr. Frank Merricks, these promise to become large producers. Altogether the Nimrod Syndicate is doing as well as, in fact much better than, most of the promoting syndicates that are directed by amateurs, and the only reason for the sudden fall in the quotation of the shares is, as I have already mentioned, the failure on the Stock Exchange of Mr. Lowry.

Johannesburg. Aug. 3.

(From Our Special Correspondent.)

While the Witwatersrand district produces the bulk of the Transvaal mineral output, considerable contributions are made by outside districts. The prospecting spirit seems to be spreading, new deposits are reported and old fields which have been idle for years are again receiving attention. While diamonds and gold are the minerals most eagerly sought, deposits of base metals are being pegged out, so to speak, for the future. The Transvaal diamond industry is rather buoyant, on account, no doubt, of the success of one mine, which is opening out well and promises to be a steady producer.

Diamond mines and prospecting syndicates are still floated. Until the old diamond law of the Boers was repealed there was little chance for a "precious stones" industry in the Transvaal. The new Legislative Council has put in force a more favorable law. The diamond output is growing. In July, 1902, it was valued at £75, and in June, 1903, £21,000, an increase of £295,000 per annum. This increase is due almost entirely to the Premier mine, in the Pretoria district, where the outlook is very promising. The shares have gone up to the neighborhood of £30. The mine is being opened up systematically, no attempt being made to rush the output. The formation is like that at Kimberley, and much the same methods of working are adopted. The open-cut method is employed; washing machines are erected; depositing floors are being prepared, etc. The mine is in no way controlled by DeBeers Consolidated. It is too early to say whether the output will grow so large that a war in diamonds between the big producers will be possible. In such a war both sides would have everything to lose and nothing to gain. Diamond propositions are rather popular, and diamantiferous ground appears on all sides. It was even stated the other day that "undoubted indications" of diamonds existed on a farm not far from Johannesburg. On the East Rand there are properties with coal seams, and hundreds of feet below, gold reefs. The next thing is for a company to be floated to work properties which, on "undoubted authority" contain gold, coal and diamonds.

The gold contribution from the outside districts is not to be despised. In June, 1903, the gross output for the Transvaal was 258,321 oz. fine gold, of which 10,153 oz. came from the outside districts. There were about 58 producing gold mines, dropping 3,750 stamps, at work in the Transvaal, made up as fol-

lows: For the Rand, 48 mines; Heidelberg district, 1; Klerksdorp district, 1; Barberton district, 6.

Investigations are being made of districts which have been pronounced unprofitable, an interesting example being the Murchison range, in the Northern Transvaal. The existence of quartz reefs in this district has been known for a long time, some astonishing results have been obtained on the outcrops, but so far the field has been looked upon as a failure. Several causes contributed, the want of transport facilities, the poor grade of mining intelligence shown, the unhealthy character of the country and the fact that the Witwatersrand fields attracted all the attention and money. The deposits appear to be rather "patchy," but the prospects do not look hopeless. The Sutherland Reef Company is working under the direction of a reliable engineer, whose last report is encouraging. He claims that the reef the company has been working is not the main reef of the property at all, and work is now in progress to prove the real reef.

In the Pietersburgh district in the Northern Transvaal, work is being done under option on a large auriferous deposit, worth about 5 dwt. per ton, which can be worked at a low cost. The big houses have their eyes open for any profitable propositions which turn up. Even in the extreme western Transvaal, not far from Mafeking, mineral deposits are being tested in a small way.

This eager prospecting proves the country, but one cannot help thinking of how little immediate use any mineral deposit is, with the industrial outlook so unsatisfactory. Until an abundant supply of cheap labor is obtainable, or the white laborers coming to this country are willing to work for one-half the ruling wages, the low grade deposits now being found and prospected will be of small practical value to South Africa.

T. LANE CARTER.

Perth, W. A. July 14.

(From Our Special Correspondent.)

Coolgardie.—Good developments are reported at Bayley's Reward. At the 400-ft. level the reef shows 3 ft. of solid quartz. The reef so far is valued at 32 dwts. per ton. The reef at the 800-ft. level has been struck. The battery, which has been idle some time, will start shortly.

At Burbank's Birthday Gift the surface plant is being increased by a large condenser to economize fuel and water. A large electric power and lighting plant is also being installed at the dam, which will pump water to the battery, light all parts of the mine and supply the current for the new signalling system. The heavy flow of water has prevented development work underground for some time, but now the main shaft will be deepened. Good stone is being broken at the 430-ft. level in C section; also at the third and fourth levels in B section.

At Menzies steady work continues. The Queensland Menzies Company is looking very well. The June yield was: Crushed 645 tons for 1,227 oz.; cyanided 480 tons for 110 ozs.; total, 1,337 oz. This mine has produced under present company's management to June 13 last 19,474 tons crushed for 37,292 oz. 15 dwt., 21,334 tons cyanided for 11,415 oz. 6 dwt.; total, 48,708 oz. 1 dwt. It has paid no less than £82,500 in dividends.

Davyhurst.—Very good returns and developments continue. The Golden Pole, owned by a Kalgoorlie syndicate, looks very well. The new battery is expected to start shortly. This mine has a magnificent body of ore opened at the 300-ft. level for a length of 400 ft., which will average 2 oz. per ton. Sinking is now proceeding to the 400-ft. level. The Eileen is worked by tributors, who expect to pay well. The lode is of good value and in some places as much as 12 to 14 ft. wide.

Murchison Gold Field.—The Great Fingall output for June was 8,193 tons for 11,029 oz. fine, value £25,856. This is somewhat less than the May return, due to the battery running some 26 hours less. The last report states that the main shaft is down 912 ft. At the No. 9 level, north, the reef averages 22 ft. wide, with values of 1 oz., 16 dwts. per ton. No. 5 level, south drive now 761 ft. from shaft, assays 4 dwt. per ton. Prospecting in and around this district continues active, and is principally carried on by local men.

North Coolgardie.—At Menzies it is proposed to erect a public battery and considerable activity is displayed in the district. On the Goodenough mine, which after considerable delay, has turned out well, a fine body of rich ore has been exposed. The continued excellent return by the Queensland Menzier mine is attracting renewed attention.

Northwest Field.—A prospector has found at about 3 ft. from surface near to Marble Bar, 2 fine nuggets, weighing 209 oz. and 30 oz. The Castlemaine lease at Mullagine has a quantity of ore still at grass, waiting for crushing 6 to 8 oz. per ton. Some difficulty is caused by the want of water.

Warren River Oil Fields.—The Government has decided to assist the syndicate in boring for oil to a depth of 1,700 ft. The syndicate bored to 900 ft., and the Government will subsidize sinking to bedrock or to 1,700 ft., as maybe.

Sydney, N. S. W. July 25.

(From Our Special Correspondent.)

Queensland.—The gold yield for June was 78,687 oz., which compares with 68,860 oz. for June of 1902. The yields from the principal fields were: Charters Towers, 41,957 oz.; Croydon, 4,223 oz.; Gympie, 14,021 oz.; Mount Morgan, 9,855 oz.; Ravenswood, 4,279 oz.

The outlook at Ravenswood is considered particularly good, development work being in full swing. The New Ravenswood, an English owned mine, is adding 10 stamps, and the output of the London is also increasing. The yield from Mount Morgan shows a falling off, as the company is putting through overburden. The average value of the ore treated by the Mount Morgan mine during the past year was 45.5s. ($10.92) per ton.

Payable reefs have been found 110 miles south of Ebagoolah, 18 miles from Laura, at the northwest end of the golden belt that runs from the desert to the Edward river.

The Mount Garnet Freehold, in the direction of Chillagoe, has had its reconstruction scheme adopted by the shareholders, the capital to be £125,000, in 250,000 shares of 10s. each.

Tasmania.—Instructions have been cabled from London to resume work at the Western mine Zeehan. About three weeks will be taken up in preliminary work at the surface prior to starting the pumps.

The saving in working expenses brought about by the amalgamation of the Mount Lyell and the North Lyell mines, is indicated by the fact that the 1,200 tons of North Lyell ore now being treated weekly by the Mount Lyell smelters, necessitates the employment of only 30 extra men at these works, while to treat the same amount at Crotty would have required the employment of 350 men to produce only matte. Now that rich ore from the North Lyell is available, the average grade of the ore of the big mine is being gradually reduced, until it gets down to 1½ per cent copper or even lower.

Victoria.—The gold yield for June was 72,458 oz., a decrease of 6,494 oz. as compared with the yield for the previous June.

Auckland, N. Z. July 29.

(From Our Special Correspondent.)

Boring for Oil.—At Kotuku, near Lake Brunner, South Island, where indications of petroleum occur, the Lake Brunner Oil Company has been carrying on boring for some time. In two of the boreholes, at depths of a little over 400 ft., a large flow of salt water mixed with a little oil was struck. In one case the water spouts to a height of 100 ft. In the other borehole the discharge of salt water is intermittent, about once an hour. The water plays to a height of 40 ft. for 2½ to 3 minutes, and then subsides. In another borehole large quantities of gas are given off.

Coal Mining in New Zealand.—At the Shag Point coal mine, in Otago, workings have been opened about half a mile south of the old shaft, and a large seam of very fine coal is mined. The workings of the new mine extend inland and not towards the sea, as did the old workings, now abandoned.

Coromandel.—Though mining matters in this section of the Hauraki field are rather quiet, its prospects are at present somewhat promising and a fair amount of gold is being obtained, particularly by Bunker's Hill, the Old Hauraki, and the Royal Oak.

New Zealand Crown.—This mine is being developed satisfactorily. Below the main adit four levels are now worked from a large incline shaft on the Crown reef now being deepened. In the southern part of the mine, about 1,200 ft. from the main shaft, a winze has been sunk to the No. 5 level. The general manager, Mr. F. Daw, estimates that in this part of the mine there are at least 90,000 tons of pay ore. Above the main adit a number of levels are worked and are contributing much pay ore to the 60-stamp mill.

Thames District.—The Thames Goldfields Improvement Committee has collected from the public, local bodies and mining companies a large sum of money towards the boring scheme it has in hand. With the Government subsidy it is thought that close on £5,000 ($25,000) will be available for boring. Arrangements have been made with the Goldfields Diamond Drilling Company, of Kalgoorlie, W. A., for a number of boreholes to be sunk 1,200 ft. or more. Opinion is somewhat divided as to the probabilities. Residents of the Thames appear confident that this field will renew its old glories, but outsiders have their doubts as to whether, considering the history and geological features of the district, a few boreholes will do very much towards proving the existence of pay ore at depths of, say, 1,000 to 1,500 ft.

GENERAL MINING NEWS.

ALASKA.

BERNER'S BAY.

(From Our Special Correspondent.)

It is said the Treadwell Mining Company has bought the Berner's Bay ledges from the Nowells, of Boston. Only those interested know the exact sum. The Nowell ground on Berner's Bay has been worked for some time with a small mill, but it is announced that the new owners will put up a large mill at once.

CAPE NOME.

(From Our Special Correspondent.)

The short season has discouraged many miners about Nome. A short summer with heavy rains and soggy ground followed a bad winter. In the Kougarok country many miners are coming back without having accomplished anything of moment. In the Tanana diggings food has not been so scarce as was represented, for several river steamers landed plenty of supplies.

The first quartz mill on the Seward peninsula started work in July on the Big Hurrah mine in the Solomon river region, owned by Mrs. Charles D. Lane and her son, Thomas Lane. It is a 10-stamp mill.

ARIZONA.

COCHISE COUNTY.

A San Francisco syndicate is reported to have purchased for Michigan men about 140 acres of land near Bisbee in the copper belt.

Copper Glance.—The pumps are now handling the water, and sinking below the 500-ft. level is pushed.

MOHAVE COUNTY.

(From Our Special Correspondent.)

With reference to the mining strike at Kingman, it may be said that the camp is not one for small operators, as the ledges are large and require capital for development. Hundreds of claims have already been located, and many men are going in. Nothing but assessment work has been done thus far.

Marquette Exploration Company.—This company, which recently took an option on the Dempsey & O'Dea gold discovery at Pilgrim, nine miles west of Chloride, has three shifts of men sinking prospect shafts.

Metallic Accident.—Thomas McNeely, who is opening this old mine near Mineral Park has cut a small vein of oxides carrying good values in gold and silver.

Oro Plata.—The mill at this mine in Todd basin which has been idle owing to the wrecking of some of the machinery, is again in operation.

Queen Bee.—Jacob Detar, the superintendent of this mine at Mineral Park has ten men at work sinking and drifting.

Samoa.—Rich ore is reported on the 350-ft. lead of this mine on the Central Range east of Chloride. The mine is worked by the Chloride Gold Mining Company. L. Hoffman is superintendent.

YAVAPAI COUNTY.

American Copper Company.—The mill recently completed is reported crushing 100 tons of ore a day, and 150 men are on the payroll.

Mohave Gold Mining Company.—The Leland-Mitchell mines are being worked by this company with 60 men, preparatory to starting the big mill.

CALIFORNIA.

CALAVERAS COUNTY.

Blue Jay.—At this mine, Mokelumne hill, owned by the Fanny Marie Mining Company, F. Courtmarsh, superintendent, work will shortly be resumed. This will be as soon as the electric transformer can be put up.

Hexter Consolidated Company.—At this mine, near Mokelumne hill, J. J. McSorley, superintendent, operations will soon begin and a large plant will be put up.

Mokelumne & Campo Seco Canal and Mining Company.—This company supplies most of the Calaveras county mines with water, and its main water line is 65 miles long, with a ditch capacity of 1,200 miners' inches. Another large reservoir is to be built this fall.

Rooney.—The 3-stamp mill of this gravel mine, near Chile gulch, is being erected. It will run by electric power.

Stockton Hill.—At this mine, near Mokelumne hill, the engines and boiler are in place. Gallows frame and hoist are all ready, water pipe laid and excavations for the mill nearly completed.

What Cheer.—A good bed of gravel has been struck in this mine, at Mokelumne hill.

Woodhouse.—At this mine, J. B. Summers, manager, a new hoist has been erected and other machinery put in.

ELDORADO COUNTY.

Crystal.—At this mine, at Shingle, owned by the Sacramento Gold Mining Company, S. C. Boarman, superintendent, the company is preparing to put in five more stamps.

INYO COUNTY.

J. S. Statler and P. Blume are opening four claims of silver-lead ore near Furnace canyon, 6 miles from Queen station, at an altitude of 8,000 ft. The main ledge is 4 ft. wide.

Poleta.—This mine, near Bishop, has been sold to Wallace McGregor and others, and will be re-opened.

MARIPOSA COUNTY.

Bear Creek Mining Company.—This company has bought the Horseshoe mill at Hunter's Valley, and will remove it to its mine at Bear creek.

Organita Mining Company.—A mortgage for $15,000 against this mine, at Hornitos, has been placed on record. The employes have already attached the mine, which belongs to a Los Angeles company.

Sweetwater.—For this mine, at Jerseydale, J. W. Jones superintendent, a 20-stamp mill is to be provided, and the property will be worked on a more extensive scale.

Three Trees.—This mine, near Hornitos, owned by the Narrow Gauge Mining Company, E. Campodonico superintendent, has started up with a full force.

NEVADA COUNTY.

Empire West Mining Company.—This company has obtained deeds to the Menlo and Omaha mining properties, comprising a number of claims, at Grass Valley. W. B. Bourn is president.

Gold Tunnel.—Ten stamps are running on good ore from this mine, at Nevada City. John Eddie superintendent. Forty men are at work.

Grass Valley Consolidated Mining Company.—J. M. O'Brien has brought action against this company, to quiet title to the Biggs and Sims and Banders claims.

Ironclad.—At this mine, near Rough and Ready, a fine vein has been encountered at a depth of 275 ft. The richest sorted ore is shipped to the Selby Smelting Works, and the average ore is milled, this latter averaging $45 per ton of late. The shaft is to be sunk 100 ft. and another level opened.

Jackson.—The 3-stamp mill is in good order on this mine, near Nevada City, and the shaft has been sunk to 110 ft.

Kentucky Ridge.—This mine, recently bought by Arthur Halsey, is to have a 10-stamp mill, grading for which is started.

Murchie Mining Company.—This company, at Nevada City, is keeping the 10 stamps of the Texas mill busy, and is shipping sulphurets to the Selby smelting works.

Old Home Mining Company.—A decree of foreclosure for $5,400 has been granted to F. Shnittger against this company.

Poverty.—Jerry Goodwin and Wm. Nichols have obtained a patent for this placer claim in Sleep Hollow, near You Bet. The patent covers all of Sleepy Hollow not previously patented. There is a deep bed of coarse tailings which is regarded as valuable.

Sierra Queen Mining Company.—It is expected that work will shortly be resumed at this mine, Nevada City, that has been closed some little time.

South Yuba Mining and Development Company.—This company, C. W. Porterfield manager, is starting an extensive gravel mining enterprise east of Omega. It owns 1,500 acres of land, and has bought the Blue Tent water rights and canal system. Five miles of flume are to be put in.

Virginia-Gold Hill.—This property, at French Corral, owned by Daniel Roberts, has been sold to Macpherson Bros., of San Francisco. There are three tunnels, each over 400 ft. long. The ore carries both copper and gold, the former predominating.

Zeibright.—This company, at Bear Valley, has decided on a new quartz mill. Fred Zeitler, formerly of the Champion Company at Nevada City, is superintendent.

PLUMAS COUNTY.

Bluff City.—This mine, near Quincy, Asa Shinn superintendent, has struck some rich stringers entirely disconnected with the main ledge.

Granite Basin.—The Bay Counties Power Company is about to run lines from the French creek power plant into the Granite basin, where are many claims needing power for pumping, hoisting and milling.

SHASTA COUNTY.

Gladstone.—This mine at French gulch, J. O. Jilson, manager, is shut down owing to a strike of the miners. The mine is owned by the Hazel Gold Mining Company, who bought it for the machinery, but found good ore, and worked it steadily until the miners struck.

Great Divide Gold Mining Company.—This company, organized last year, obtained an option on a mine in Mule mountain district. The company has been extensively advertising, but the editor of a local paper interviewed the president, who states that the company has only an option on a claim. Moreover, no consolidation has been made with the Northern California Gold Mining Company. The latter company is doing considerable advertising, claiming, among other things, some 26,000,000 tons of ore in sight in one of the mines in Cow creek district.

Old Diggings.—This district, near Redding, is shipping about 250 tons of quartz weekly to the smelters of the Mountain Copper Company at Keswick. It comes from the Mammoth, Spanish, Central and Garfield claims. The Crown Deep mine at Middle creek is also sending quartz to the smelter.

Original Quartz Hill.—On this mine at Round mountain a modern milling plant is to be erected.

SIERRA COUNTY.

Balsam Flat.—A corporation called the Alleghany Mining Company has been organized to work this gravel mine near Alleghany. J. W. Morrill is at the head of it.

SISKIYOU COUNTY.

Headquarters.—Two small ledges have been tapped in the tunnel being run on this claim on Humbug creek. Hegler Brothers are doing the work.

Sheba.—Thos. McAuley and Chas. Fry have obtained a lease of this property on Patterson creek and will put it in shape.

TRINITY COUNTY.

Coffee Creek District.—Mining matters are prosperous. At the Wagner mine 12 stamps are dropping. The Golden Jubilee is to start an increased force. The Strode mill is crushing high grade ore.

Integral.—At this quicksilver mine at Altoona, 25 men are employed under superintendent Frank Mahon. A good body of ore has recently been found. The dumps are worked over by a party of Swedes.

TUOLUMNE COUNTY.

Big Casino Company.—This company is to put two Merrals mills on the Maco mine.

Draper.—The pumps have stopped in this mine at Soulsbyville. The miners were not paid and quit.

Norwegian.—This pocket mine at Tuttletown is idle. The workings were badly damaged last winter by heavy rains.

Rawhide.—At this property at Jamestown, W. A. Nevills, owner and manager, the cyanide plant is 100 tons capacity.

SACRAMENTO COUNTY.

Folsom Development Company.—This company will put in a dredger on the Reed place, near Rebel hill.

SAN BERNARDINO COUNTY.

Gold Peak.—Good progress is made in opening this mine, near Victorville. The ore is 20 in. wide, and assays nearly $40 per ton.

SAN DIEGO COUNTY.

Owens.—R. A. Gurley, of Denver, has under consideration a bond on the Owens mine, one of the oldest claims at Julian. The mine has been pumped out and a thorough examination will be made.

SAN LUIS OBISPO COUNTY.

Chorro.—The mill at this mine, 5 miles from San Luis Obispo, has started. This is a new section of the county for gold mining.

COLORADO.

SAN JUAN COUNTY.

(*From Our Special Correspondent.*)

Silver Lake.—A large boarding house and other necessary buildings are being erected at the Unity tunnel, near Silverton, for the additional working force.

Wabuse Mining Company.—Work is to be resumed at once on the Little Adnie group in Hematite basin, near Silverton. A tunnel site has been secured and the vein will be cut at a vertical depth of 700 ft.

Yukon Tunnel.—Driving continues steadily, the breast now being in 1,800 ft., with a perpendicular depth of 2,000 ft. The goal is the Uncle Sam vein, 600 ft. ahead.

CLEAR CREEK COUNTY.

Doric.—This tunnel near Georgetown, it is reported, will be completed shortly.

St. Joseph.—A first-class plant of machinery has been installed on this property, at the head of Gilpin gulch, formerly in operation on the DeLesseps group. The shaft is now down between 200 and 300 ft., and will be sunk further.

CUSTER COUNTY.

American Flag.—A large body of ore is reported opened at this mine, near Querida. A drift is being run from the 180-ft. level of the shaft.

GILPIN COUNTY.

(*From Our Special Correspondent.*)

Alps.—Local men are interested with James Williams, Nevadaville, superintendent. The last carload of smelting ores brought values of $200 to the ton. The ores are coming from a depth of 1,300 ft., and regular shipments are made to the mills also.

Federal.—The men who have a lease and bond are to install machinery and work the Federal and Becky Sharpe through the Federal shaft. A recent shipment of concentrates brought $70 to the ton. R. Hughes, Russell Gulch, is in charge.

Gomer.—Idaho Springs men have taken a lease and bond and installed a steam plant. The property is in Russell district. M. W. Tanner, Idaho Springs, is in charge.

Kemp-Calhoun.—Manhire Brothers, of Russell Gulch, who are working under a lease and bond, received returns from a carload shipment giving returns of $250 to the ton for first class ore.

Missouri.—Denver and eastern men are starting up this property with Pat McCann, Central City, as manager. It is owned by Dr. Henry Paul, of Littleton, Colo. The shaft is down 400 ft., with 300 ft. of water in it. The machinery is being overhauled.

GUNNISON COUNTY.

Augusta.—A body of rich ore is reported opened in this mine, owned by the Augusta Metal Mining Company. For 19 months the owners have been driving a development tunnel into the mountain, which is now 3,000 ft.

Waunita Consolidated Company.—This company, recently incorporated, has four claims in the Bowerman district, a mile south of the Bowerman-Dunn property, called the Wabash and B. & O. group. The company owns, besides this group, 100 acres of placer ground. Sherman Bell is president of the company and K. C. Sterling secretary and treasurer. Among the directors are Dr. J. B. Sanford, John Kent, Jr., of Buffalo, N. Y.; John T. Ball, of Hillsdale, Mich., and Fred McMillan, of Des Moines, Ia.

LAKE COUNTY—LEADVILLE.

(*From Our Special Correspondent.*)

The closing down of the smelters at Denver and the Cripple Creek strike shut down are slightly felt here, but production averages 2,500 tons daily of all classes of material, and the Arkansas Valley plant of the American Smelting and Refining Company at Leadville is running full force.

A Y & Minnie.—The concentrating mill is taking 100 tons daily, which returns 70 tons of lead and zinc concentrates. The zinc concentrates are handled through Jacobson & Company, New York, while the lead goes to the local smelter.

Buffehr.—Some very good gold ore has been encountered in new territory. The property is well located in English gulch.

Collins.—The Arnold, Reno and Big Evans Companies' properties were sold this week at sheriff's sale. Mr. Collins states that he spent $200,000 in the various enterprises.

Coronado.—Diamond drill work is carried on. The company is shipping 125 tons of iron daily.

Elk Combination.—Denver men control the Elk lease, and are shipping 200 tons monthly of oxidized ore.

Fanchon.—Financial aid has been secured, and the property is to resume at once. Manager Bowles states that the shaft will be sunk 200 ft. and a cross-cut run to cut the Dinero, Orinoco and Gunnison veins.

Fryer Hill Mines Company.—Two 80-h.p. boilers have been put in preparatory to sinking the Pride of the West shaft to the ore. The Harvard shaft will also be deepened. Meantime the company is shipping 2,000 tons a month of good ore.

Fitzhugh.—Shipments will soon be resumed after an idleness of 7 years. Lessees Kyle & Estey are running a drift at the 432-ft. level to the sulphide stope. The property is owned by the Elkhorn Company of London, and has been idle since the labor troubles of '96.

Fortune.—A new plant is being erected to take place of the one destroyed by fire. Some work is being done at the 1,000-ft. level.

Green Mountain Boy.—Local men have a lease, and are re-timbering. The Lepper, owned by T. S. Wood, and nearby, has also been leased, and will be developed.

Grover Cleveland.—St. Louis capital is interested in the new lease on this gold belt proposition. A new 200-ft. shaft shows at 25 ft. down gold-bearing sulphide ore.

Midas.—Shipments from the big iron bodies have resumed at 125 to 150 tons daily. All connections are completed with the Coronado workings, and the Midas is prepared to ship heavily.

New Leadville Home Mining Company.—Seventy-five to 100 tons daily of good grade iron came from the Penrose.

Reliance Mining Company.—A fine equipment has been put in, and the Reno and other territory is to be developed.

Resurrection Gold Mining Company.—Work has resumed on No. 1, and production will be steady. The new concentrating mill has started, handling 130 tons daily. The mill handles the low-grade sulphide ore by magnetic separation. No. 2 shaft is to be deepened soon. Little water is now handled.

South Mosquito.—Eben Smith, C. T. Carnahan and others are at the head of a combination to sink a deep shaft in South Mosquito, where the diamond drill shows rich mineralization.

Tiger.—The new work on this Iowa gulch property shows very rich ore. The tunnel is being driven to connect with the shaft, the vein showing an assay of 10 to 30 oz. gold.

Valley Mining Company.—An upraise is to reach the main ore body. While driving the drifts some pockets have been cut running 7 to 8 oz. gold, the screenings of which yield $38 a ton. Massachusetts people are back of the enterprise.

Wolftone.—Thirty tons crude zinc come from the Adams daily, while the Wolftone is producing 100 tons for the mill. The surface plant and shaft have been repaired.

OURAY COUNTY.

Inter-Ocean.—It is reported that a Beam automatic roaster and cyanide plant will be installed at this mine near Sunshine.

Micky Breen.—The repairs are completed and the new machinery is about ready. A tramway will connect the mine with the Tempest.

Treasury Tunnel and Mining Company.—A vein of rich ore is reported opened, and a carload has been shipped.

IDAHO.

WASHINGTON COUNTY.

(From Our Special Correspondent.)

Ladds Metal Company.—This company is acquiring mining property throughout Idaho, Oregon and Washington and has installed a smelter of 60 tons' capacity on its property in this county consisting of 35 claims.

CUSTER COUNTY.

Lost Packer.—A local paper is authority for the statement that the order placed recently for a mill for this property, on Loon creek, has been rescinded. The directors concluded it best to do further development work.

IDAHO COUNTY.

Jumbo.—This property, at Buffalo Hump, Frank Brown, manager, has 4 stamps working, and will soon have 15.

SHOSHONE COUNTY.

Mascot.—The plant at this mine is being dismantled and everything saleable hauled to Orofino to be sold. This property was acquired last year by the Gold Creek Consolidated Mining Company of New Jersey, and a large force of men employed. This year nothing has been done, and the owners concluded to realize from the sale of machinery, etc., and abandon the mine.

Wild Rose.—This company, east of Pierce City, is planning the installation of a cyanide plant. The time required for percolation of the solution on the Wild Rose tailings has been determined at 72 hrs.

INDIANA.

CLAY COUNTY.

(From Our Special Correspondent.)

Merchants' and Manufacturers' Co-operative Coal Company.—Most of the stockholders of this company live in Chicago, and with the Andrew Coal Company has disposed of its coal land and mines in this county to the National Coal Company, of Detroit, Mich. The Andrew was the oldest coal company in the county. P. D. Andrew, long since dead, however, sunk the first shaft on the ground where the First National Bank of Brazil now stands.

SULLIVAN COUNTY.

(From Our Special Correspondent.)

Coal Mining Developments.—There are at present within seven miles north and east of Sullivan 11 new coal mines. The Union Coal Company, the United States Steel Corporation, the United Coal Company, the T. C. Keller and Mammoth Vein companies are each sinking a shaft four miles north of Sullivan. W. S. Bogle and the Mildred mine company are sinking shafts and two more shafts have been ordered by the Evanston & Terre Haute Railroad Company, while the Jackson Hill Coal Company is sinking two shafts north of Mildred.

LOUISIANA.

CALCASIEU PARISH.

(From Our Special Correspondent.)

Jennings Oil Field.—The Citizens' Oil Company is endeavoring to cut off the flow of salt water in its well one mile west of Jennings. The Simon Oil Company's well 1,500 ft. west of the proven field has been abandoned at a depth of 2,003 ft. The Gulf Coast Development Company's well near Jennings is down over 800 ft. Morse Oil Company's well No. 5 is expected in daily. The W. H. Rodgers Pipe Line Company has finally acquired the right of way for its 100-mile line to Beaumont.

MICHIGAN.

IRON—MARQUETTE RANGE.

Mary Charlotte.—This mine, at Negaunee, operated by the Breitung Mining Company, is shipping a fine quality of bessemer, a considerable deposit having been proved up.

Moore.—The Oliver Mining Company has completed stripping this mine, on the Cascade range, near Ishpeming, and is prepared to ship from it. This will not be until another year, when the company's big ore crushing plant at Escanaba is in commission. The Escanaba plant will be the largest and most complete ever built and will handle hard ores from Steel Trust mines on the Menominee and Marquette ranges.

MINNESOTA.

(From Our Special Correspondent.)

At the Great Northern ore docks recently the Provident Company's ship *James H. Hoyt* loaded 5,376 gross tons of ore in 30½ minutes. No such record has ever been made on Lake Superior, and if not there it goes without saying that it has nowhere else. The *Hoyt* has hatches spaced with 12-ft. centers, the same as dock spouts, thus permitting loading with little shifting of the ship alongside dock.

IRON—MESABI RANGE.

(From Our Special Correspondent.)

Drill work on the Western Mesabi is not as active as a few weeks or months ago, and may continue for some time. Several operators have removed a considerable share of their machines. New mining and exploration companies have been organized for Mesabi range work as follows within the past few days: Lewis Iron and Exploration Company, to explore on contract and private account, capital $25,000, incorporators Messrs. John, Frank and Edward Kleffman; Alpha Mining Company, capital $300,000, incorporators P. C. Schmidt, H. B. Fryberger, O. Mitchell, T. W. Wahl; Mesaba Cliffs Mining Company, capital $300,000, incorporators W. G. Crosbym, E. B. Gridley, T. A. Gall.

At section 6, T 58, R 15, about 800,000 tons of high grade ore are said to have been proved by the Minnesota Iron Company in explorations on the Daniels-Spellman lands. Adjoining this both east and west drills are working.

Both the Cass and Kanawha mines, at Biwabik, have reduced forces, and will mine but slowly for the present. They are both managed from the office of Joseph Sellwood, of Duluth.

Total shipments from Corrigan, McKinney & Co. mines will this season amount to about 1,500,000 tons, or some 500,000 tons less than was anticipated. So far these mines have sent down 1,000,000 tons, of which the Stevenson has produced about 750,000 tons. The Commodore, which was expected to make a large shipment, is doing little more than a minimum, and the Jordan has reduced its force.

Adams.—Milling at the new open pit started last week. This pit is from 40 to 65 ft. deep and 200,000 cu. yds. have been removed from the surface since last November. The surface is very hard clay, full of granite boulders. The pit is 500 ft. from No. 4 shaft and all ore milled will be trammed to that shaft by electric locomotives. Stripping is to continue. The Adams-Spruce output this year will be the largest ever made by an underground mine, as practically all the ore comes this year from underground. Last year the mine shipped more than 1,785,000 tons from shafts.

Burt.—At the Burt open pit near Hibbing, 3,500 yards of stripping are moved each day and the mining company is taking out from 6,000 to 8,000 tons of ore. This pit was started last summer and is now about 500 ft. wide and nearly 1,500 ft. long. The company shovels are mining on the south side the pit, while stripping continues on the north.

Clark.—The new No. 3 shaft is down 180 ft. Engine and boiler houses are under way. No. 1 shaft will be abandoned, and all ore hoisted from 2 and 3 next year.

Crosby.—Stripping has ceased at this mine in section 32, T 57, R 22, and but little will be done the rest of the year. The property has not proved up as expected. The operating company takes the mine at a royalty of 27c. a ton on all ore running above 56 per cent. iron, without regard to phosphorus. The mine is supposed to contain as far as shown about 1,500,000 tons.

Lewis Exploration Company.—This company has been formed to explore a number of tracts that have been secured under options. Several of these are near the Buckeye at the extreme west, and are lands M. L. Fay has explored unsuccessfully. Others are in the extreme western end of the range in section 1, T. 59, R. 14, on Silverman lands, which have been explored at various times.

Monroe.—Contracts for 50 dwellings and other buildings have been let by the Minnesota Iron Company, and stripping contracts, to be the largest ever let on any range, will probably be placed shortly. It is expected that bids will be at a lower figure than recent work, if they are not the company may not let the whole job now. The mine is known to contain nearly 30,000,000 tons of ore, and may have more. It is one of the 11 properties just bought by the United States Steel Corporation from the Chemung Iron Company, and is the largest of them. This property belonged to Corrigan, McKinney & Co., who let it go some years ago at a slightly advanced royalty. The fee owners are the John S. Pillsbury estate, of Minneapolis, 50 per cent, R. M. Bennett, of Minneapolis, and John M. Longyear of Brooklyn, Mass., 47 per cent, and E. J. Longyear 3 per cent. The Chemung Iron Company's royalty is 25c. In a year or two this will be one of the very large producers of the Mesabi.

Turney Lands.—Exploration is begun on the Turney lands, in section 24, T 58, R 18, and a drill is to be put to work. These lands have been regarded as of little consequence by well posted mining men and Mesabi geologists.

IRON—VERMILION RANGE.

(From Our Special Correspondent.)

Oliver Mining Company.—New laboratory and offices will be erected soon for the Ely mines. Numerous dwellings are being built for employees.

At the Zenith mine, the deep vertical shaft is being sunk very fast, and will be completed some time next year probably. The mine is shipping more ore than ever before, and is opening up wonderfully well underground.

At the Chandler a new engine house at No. 5 is being built, the old one having been destroyed by caving ground. The mine is shipping heavily this year, and will make a record about the same as in 1902.

Railroad storage and switching yards at Ely, at both the Chandler and Pioneer mines will be entirely remodeled and much enlarged at once. A large rock cut is now going on for the Chandler enlargement.

Drills have been put at work on section 25, east of Ely, and near where several costly explorations had resulted unsuccessfully in past years. The drills are now quite a ways down in greenstone.

At the Pioneer mine is still a stockpile of 90,000 tons, left over. The pile held 210,000 tons at the opening of navigation. Total shipments for the season to date have been about 350,000 tons, and for the remainder of the season they will be about 325,000 tons more. The company is to erect an immense steel shafthouse at B, its new deep steel lined shaft, that will be an all-steel, two compartment and ladder road building 168 ft. high, with arrangements for sorting ores, and with ample pocket storage. It is a trifle larger than the houses at Sibley and Savoy mines, and of the same general plan, though modified and improved. The superstructure will be constructed by the American Bridge Company, and the foundations are completed. Five-ton skips will be used for hoisting, and the engines, which are to be generally similar to those put in a year ago at the Sibley-Savoy, are to hoist at a speed of 2,000 ft. per minute. The shaft is now down 1,068 ft., to the 12th level and two new levels are being opened in ore. A large pumping plant is to be installed. Boiler and engine houses, covering about 5,250 ft. of ground, are under way and a stack 125 ft. high is going up. At this engine house will be two 26 by 60 Corliss engines operating 12-ft. direct motion winding drums, hoisting the balanced or unbalanced 5-ton loads 2,000 ft. per minute. Steam will be furnished by three 150 h. p. return flue tubular boilers, each 70 by 216 in. The machinery plant will cost a little less than $100,000. Old A shaft will probably have to be rebuilt after B gets into commission.

Tesora Mining Company.—This company, which has confined its work to the Mesabi, has started drilling operations on the west side of Long Lake, west of the Chandler mine. So far, it is reported, nothing of value has been found.

MISSOURI.

JASPER COUNTY.

Missouri Zinc Fields Company.—The installation of the large duplex compound condensing pump by this concern will insure the lowering of the water level on the tracts between Webb City and Carterville to about 200 ft. This is to date the largest station pump which has been placed in the district. The following description is given: It is a Prescott pump, with these dimensions—high pressure steam cylinders, 12 by 24; low pressure steam cylinders, 24 by 24; water plungers, 12 by 24; total length of pump is about 18 ft., width 6 ft., and height 6 ft.; the whole weighing about 15 tons. Its water capacity is rated from 1,200 to 1,500 gal. per minute against a head of 250 ft. Tests made indicate that in case of necessity it can throw 1,800 gal. per min. The pump is installed at a depth of 182 ft., with a pump seat 10 by 25 ft., with a side chamber 8 by 10 ft.

MONTANA.

CHOTEAU COUNTY.

Alder Gulch Mining Company.—The cyanide mill of this company has been completed and placed in operation. It is in the Little Rocky mountains, near Landusky, and has a capacity of 100 tons daily.

GRANITE COUNTY.

(*From Our Special Correspondent.*)

Sunday.—The shaft has reached a depth of 200 ft. Thirty-six miners are employed. The Huntington mill is grinding 8 tons per day, the bullion receipts from which are about $1,800 a week. The mine and mill are in charge of P. C. Waite, of Royal.

JEFFERSON COUNTY.

Baltimore.—Wise & Moore, of Butte, have bonded and leased this mine near Boulder and several other claims nearby.

(*From Our Special Correspondent.*)

Molybdenite.—A vein of this mineral occurring in white quartz is under development about eight miles from Butte on the main continental divide. The mineral is distributed through several feet of quartz. The property is owned by Geo. W. Winter, of Butte, and Mike Garrity, of Homestake. Some method of concentration will be required to dress the mineral for commerce. The dressed mineral assays 55 per cent Mo.

Rose Gold Mining Company.—The claims of this company are on the head of Golconda. The company was organized in New York last season. Some very rich gold ore has been found in the New York claim. With honest and intelligent management the property will undoubtedly be heard from. A body of quartz-porphyry runs through the hill.

MADISON COUNTY.

W. A. Clark is reported to have secured an option on a number of iron mines located 18 miles south of Butte, bringing the ore to Butte to be used chiefly for fluxing purposes. The ore also contains some gold.

(*From Our Special Correspondent.*)

Little Kidd.—Harry Bush and associates have secured from O. P. Chisholm, of Bozeman, a bond and lease on this property in the Tobacco Root range at the head of Meadow creek. The mine is opened by four tunnels on the lead. A Bryan mill was worn out on the property some years ago. Since then the mine has been relocated by the present owners. The ore is an iron sulphide. The former owners placed a value on the property of $100,000.

Manila Group.—These claims in Coles' canyon, seven miles from Twin Bridges, and formerly known as the Copper Queen property, are to be operated by the firm of Morley & Thomas, of Butte. The former lessees sunk a shaft 220 ft. deep and then threw up the bond. The intention is to pump the water out and sink an additional 200 ft. The machinery used to sink the Big Show shaft is being placed on the Manila and will be used until a heavier plant is required.

Rochester Gold Mining Company.—Work has again been resumed in the Champion mine. The mine was closed for a few days, making arrangements to change the system of working the mine from a contract to day's pay. The company will employ 30 to 40 men.

SWEET GRASS COUNTY.

Standard.—Work has been suspended on these properties at Contract, 30 miles south of Big Timber, and the manager, Charles R. Murdock, is at Bristol, S. D., to attend a meeting of the stockholders. A considerable amount of development work was done in the Standard mine, and it is understood the result was not encouraging.

PARK COUNTY.

(*From Our Special Correspondent.*)

Cokedale.—This camp, 8 miles from Livingston, after having been deserted for 8 years, is again active. The coal mines are owned and were formerly operated by the Helena & Livingston Smelting & Refining Company, which company formerly owned the smelting plant at East Helena and depended on the mines at Cokedale for coke. When the Helena & Livingston Company sold the smelting plant to the United Smelting Company the Cokedale mines were not included in the deal. The coal properties closed down and have remained closed since because a fire destroyed the headworks and machinery. The company cottages have been placed in repair, the coke ovens are being put in shape and new ones being built. The water has been pumped out of the mine. The branch railroad is being improved by the Northern Pacific. It is thought that the Amalgamated Copper Company will use most of the product from the coke ovens.

Cowles Mining Company.—A new mill, to be run by electric power to be taken from the Boulder river, is one of the improvements contemplated by this company, with headquarters at Cowles. E. W. Cowles is general manager.

NEW MEXICO.

SAN MIGUEL COUNTY.

Tecolote.—The new process cyanide mill at this place, erected by Buck and Elliott, of Denver, is reported giving good results, and a 150-ton plant is to be put up. The present one is a 25-ton affair.

SANTA FE COUNTY.

Santa Fe Gold and Copper Company.—The mines and smelter of this company, at San Pedro, which have been closed for over a year, are to resume operations. About 600 men are employed when running at full capacity.

OREGON.

CROOK COUNTY.

Oregon King.—After the loss of 2 years' time, and expense of $25,000 in legal action and the additional cost of buying off the opposing litigants, Messrs. Cartwright and Edwards, owners of this mine, will resume operations. A 20-stamp mill is to be erected and a pumping plant will also be necessary to unwater the workings.

JOSEPHINE COUNTY.

Granite Hill.—A 100-h. p. boiler, engines, compressors, hoists and other machinery have arrived at Grant's Pass and are being hauled out to the mines on Louse creek. The 10-stamp mill will be ready for work within 60 days. Mr. Murphy is manager.

PENNSYLVANIA.

ANTHRACITE COAL.

Audenried Coal Company.—Operations at the Star washery of this company are to be suspended indefinitely.

BITUMINOUS COAL.

Puritan Coke Company.—This company of McClellandtown has fired 64 of its ovens, and the remainder of the battery of 132 ovens will be fired within a month. The company owns 300 acres of coal land.

SOUTH DAKOTA.

LAWRENCE COUNTY.

(*From Our Special Correspondent.*)

Horseshoe Company.—Sixty stamps of the Horseshoe Company are dropping in the new cyanide mill at Terry. Sixty-five more stamps will be ready in a few days. The plant was completed by James Hartgering. The capacity of the mill will be 650 tons.

Lucky Strike.—A steam hoist is being installed.

Penobscot Company.—The cleanup amounts to $30,000 per month. One car (30 tons) of high-grade ore is shipped every other day to the smelter.

United Ruby.—Financial backing has been given this company and development work is to start on the ground in Elk creek.

PENNINGTON COUNTY.

Horseshoe Mining Company.—The big smelter of this company at Rapid City is to be started early in September. The company will ship its high-grade ore from its mine to the smelter.

(*From Our Special Correspondent.*)

Ama Queen.—J. C. Sherman and associates, of Pactola, are about to start the stamp mill on the property two miles south of Custer Peak. The property was worked in early days.

Rapid Creek Cyanide Plant.—Excellent results are reported from the new cyanide plant on Rapid creek, built to save the fine gold in the placer of the creek.

TEXAS.

HARDIN COUNTY.

(*From Our Special Correspondent.*)

Sour Lake Oil Field.—The big Beatty gusher is under control, the successful contractors receiving $1,000 for their two hours' dangerous work. The well is on the Cannon tract, is 1,050 ft. deep and was drilled in 12 days.

The following companies have new wells: L. P. Crow, Minor Oil Company, Kensler & Gendry, Buffalo Oil Company.

The fire on August 20 in the Shoestring tract was confined to a small section; the total damage to derricks and machinery aggregated $10,000. It was very fortunate that the flames did not reach the tanks and flowing wells 100 ft. north.

Many tanks of large capacity are under construction and it is certain that with increased storage and pipe lines the price of crude oil will materially advance inside of 60 days.

The pipe lines of the Texas Company and the Guffy Company are used to full capacity, while the rail shipments are almost entirely for railway consumption or storage, so that the fuel oil consumers have not yet received any benefit from the large supply or low prices. The shipments aggregate 30,000 to 35,000 bbls. daily, while it is said that the daily capacity of the present wells is fully 200,000 bbls. The immense quantity of waste oil is a serious menace to the wells, to the town and to the rice fields along the bayous.

Business is now conducted on a solid basis—there are very few fake companies and the advance in crude, when it comes, will not find well owners tied up by contracts that will put them in bankruptcy.

Big Mound Oil Company.—This company is drilling a well half way between Beaumont and Sour Lake.

Tobin, Daniels & Jackson.—This company's well, which came in August 11, is said to be equal to any of the best gushers drilled on Spindle Top.

JEFFERSON COUNTY.

(*From Our Special Correspondent.*)

Beaumont Oil Field.—Very little is being done at Spindle Top—only 70 wells are being pumped and the total daily production has declined to less than 14,000 bbls., of which the Guffy Petroleum Company gets over two-thirds. When prices for crude advance other wells will be pumped, but with Sour Lake oil selling at 4@10c. per bbl. there is no likelihood of any new development.

VIRGINIA.

HALIFAX COUNTY.

Blue Wing.—This copper mine, near Virgilina, J. B. Hart superintendent, has shut down indefinitely.

Virginia.—A force of 75 men is working on this copper proposition at High Hill, which has recently resumed work.

FOREIGN MINING NEWS.

CANADA.

ALBERTA.

Northeast Crow's Nest Coal and Coke Company.—This company has been organized with Spokane capital. The land is situated 6 miles east of the Frank coal-fields, and one and a half miles north of Burmiss siding, on the Canadian Pacific road. The officers are: Dr. D. T. Thomas, president; Mrs. Elinor Thomas; vice-president; Pierce Jones, second vice-president; B. J. Onstine, secretary; John Roche, treasurer.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Porto Rico.—George H. Barnhart, late mill superintendent of the Ymir company, has leased this mine, located near Porto Rico siding on the Nelson & Fort Sheppard Railway between Ymir and Nelson. A 7-drill compressor and a 10-stamp mill are on the property. The ore is free milling quartz.

MINING STOCKS.

(Full quotations are given on pages 375 and 376.)

New York. Sept. 3.

The general appearance of the stock market is strong, but there are intervals when speculation lags and prices assume the level that usually intimates uncertainty in the belief of a substantial recovery soon. Perhaps the near approach of the end of the vacation season has encouraged some brokers to try and lift the market. It seems difficult, however, to rehabilitate the copper group, although Amalgamated has been influenced by the talk that it may acquire control of certain properties in the Lake Superior region. To counteract this good effect comes the report of adverse litigation in Montana. On Monday there were sales of 71,975 shares of Amalgamated at $51½@$48⅛, and 800 shares of Anaconda at $21⅝ @$21 7-16. On curb little interest is shown in the coppers. Greene Consolidated, of Mexico, brought $19⅛@$18⅞; United common, of Montana, $15⅞, and White Knob, of Idaho, $10½.

Gold and silver stocks have been somewhat more active, but prices generally showed weakness. The first sale of Homestake, of South Dakota, in a long time was reported last week at $56, which at the regular payment of dividends yields over 10 per cent per annum. Horn Silver, of Utah, another stock

seldom traded in as it is well supported by insiders, changed hands this week at $1.10. Ontario sold at $4.50@$5.50, after being absent some time. Portland, of Cripple Creek, made a move at $1.21, but sales are limited. Elkton, in the same district, sold at 39c. In the Comstock section, Consolidated California and Virginia found buyers at $1.30 and Ophir at $1.50. A fair business has also been done in the low-priced shares.

Boston. Sept. 1.

(From Our Special Correspondent.)

The official announcement that a deal is on between the Copper Range Consolidated and Tri-mountain companies put a quietus on stock speculation and trading has been chiefly on a limited scale. Thursday of last week Calumet & Hecla was boosted from $450 to $485 per share and Tamarack from $105 to $115, but it was purely manipulation. Tri-Mountain has fallen from $82 to $73.50, while Copper Range has fluctuated between $67.75 and $63.87½, closing at $65.62½. The directors' meeting of the Tri-Mountain called for last Thursday, has been adjourned to September 4. A circular issued by the Copper Range calls for a special meeting September 8 to see if stockholders will authorize an increase of 100,000 shares and the acquisition of part or the whole of the stock of the Tri-Mountain Mining Company or the property of the same at $100 per share. About 70,000 shares of Tri-Mountain are held by a few people, and it is understood that the minority holdings are to be purchased for not over $100 per share.

St. Mary's Mineral Land sold for $50@$51 this week. Trinity touched $8, closing at $7.50. United States Mining holds close to $20. The company paid off $245,000 of the 7 per cent first mortgage convertible bonds at 105. The total outstanding issue was $320,000, but holders of $75,000 took advantage of the extension clause. Centennial varied from $22 to $20.50. Wolverine holds strong at $73@$74. The fall dividend on Osceola, it is said, will be $1.50 per share or nothing. Rock shipments are keeping six stamps supplied. Old Dominion holds close to $10. President Smith states that the company is in no immediate need of funds, but will issue $500,000 bonds at a later date. Parrot is off $1 net for the week at $21. The price of this stock and Anaconda hold pretty close together. Shannon sold off $1.87½ to $10.12½ on realizing sales. Utah has fluctuated between $27.12½@$28.50, Mohawk at $44.50@$43.50, and Bingham at $26.50@$26. The feeling on both copper shares and the metal is moderately bullish.

Colorado Springs. Aug. 28.

(From Our Special Correspondent.)

The market during the past few days has taken a strong brace and prices closed firmer than for some weeks. As the strike situation gradually approaches a compromise, the market has taken on renewed activity. The sale of the control of the Portland stock to the Ryan-Whitney syndicate and the Guggenheim Exploration Company has also had a strengthening effect, and the brokers generally are inclined to view the situation from a bullish standpoint. C. K. & N. remained almost stationary during the week, selling at 17¼c., a slight increase over last week. Elkton closed last week at 39c. bid, gradually selling up to 41c. without bringing out any stock. El Paso closed last week at 55c. bid and advanced steadily to 59¾c. bid to-day, sales being made at 60c. Gold Dollar Consolidated sold at 4@4¼c.. Isabella proved to be a popular trader at advanced prices, selling at 11¼c. Lexington was a heavy trader at 3⅜c. Portland's bid price advanced from $1.20 to $1.21, selling at $1.22. Among the prospects Old Gold was easily the leader, selling at 7c. to-day. A good production is being maintained from this property, which is no doubt responsible for the advanced price. The miscellaneous list was active, good prices prevailing.

San Francisco. Aug. 27.

(From Our Special Correspondent.)

There was a firmer tendency shown in the more prominent north end Comstock stocks, but sales are still limited, as the persistency of officials in levying assessments has rather discouraged public investment.

Some quotations noted are: Best & Belcher, $1.50; Consolidated California & Virginia, $1.40; Ophir, $1.50, and Mexican, 98c.

Business on the San Francisco & Tonopah Mining Exchange has been small, in fact, at times the market looked sick, as so few orders were in evidence. Of the sales recorded Pine Grove brought 54c.; Gypsy Queen, 26c.; Tonopah-California, 33c., and Esperanza, the most active, at 3c. Montana-Tonopah was bid for at $1.05, Tonopah-Belmont at $1.75, and Tonopah, of Nevada, at $6; but nothing of importance was done in these securities.

More interest was shown in the oil stocks, and some gossip arose over the resignation of the president and a director in the Home Oil Company, as a result of dissatisfaction among certain stockholders. These vacancies have been filled by appointment of F. P. Cutting as president, and J. H. Mallert, Jr., a director. Home shares were offered rather freely, and sales are noted at $1.17½. Hanford shares were strong at $1.35, and Monte Cristo at 65c.

COAL TRADE REVIEW.

New York, Sept. 2.

ANTHRACITE.

The anthracite coal trade continues quiet. August was the dullest month of the year so far, but September will quite possibly be duller, as from now until cold weather really comes buying is likely to be light. All consumers who were anxious about winter supplies and cared to lay in coal early have now enough, while those consumers who buy in small lots will not be heard from uutil cold weather. The movement of anthracite from the mines continues well distributed.

Demand in the Northwest is active, and the slackening demand in the East permits a larger proportion of the output to go to Chicago and beyond, with the result that the movement from Buffalo and other lower lake ports to Lake Superior points is heavy.

In Chicago territory most consumers seem to have all the coal they want at present, while wholesalers have agents on the road looking for business among country yards. Along the lower lakes and in Canadian territory buying is still pretty active. In the line trade demand is light, as it is along the seaboard, except at points beyond Cape Cod, especially at shoal water ports, where there are many small yards that still want coal.

The steam sizes are, as they have been, in liberal supply, and prices show a wide range, some washery coal selling at very low figures. It is stated that the Philadelphia & Reading Coal and Iron Company has closed down its washeries owing to the supply of steam sizes it has on hand, estimated at 300,000 tons. This action, of course, does not affect the output of steam sizes from its breakers. The prices for free-burning white ash coal, f. o. b. New York Harbor shipping ports are now on the winter basis at: Broken, $4.75; egg, stove and chestnut, $5.

BITUMINOUS.

The seaboard bituminous trade is generally quiet, though producers of the better grades of Clearfield claim that the demand has improved, and, some of them claim that they see the beginning of the regular fall movement, with better business from now on. Producers of New River, Georges Creek and other high grade coals, however, report no increase in demand. The current prices, f. o. b. New York Harbor for Clearfield are $2.50 and $2.75, and sales of best quality Clearfield at $3 are reported. There is little talk of car supply on account of the light demand for coal, but cars have been short within the last few days.

Trade in the far East continues rather quiet, nearly all if not all shipments being on contracts. Consumers show no disposition to lay in coal now. Along Long Island Sound some labor disputes have been settled, mills are starting up and consumers are more careful to keep stocks intact. The New York, New Haven & Hartford Railroad is using its influence to have coal come into Long Island Sound territory all-rail, instead of by water and rail, as now, thus giving the road an advantage in its proportion of the railway freight rate and also helping it out in the matter of car supply. It is thought, however, that the main lines on which the coal originates will think it to their advantage on account of car supply, to have the coal go as now to tidewater terminals and thence by barge to the discharging ports. At New York Harbor points trade is quiet, and outside of regular contracts demand is light. All-rail trade shows no change, and reports of low-mine prices are commoner there than in other territories.

Transportation from the mines to the tidewater ports has been interrupted, but is fairly good, and is showing improvement. Car supply is around 50 to 60 per cent of the demand. In the coastwise vessel market rates are weak. We quote as follows: Providence, New Bedford and Long Island Sound, 70c.; Boston and Salem, 85c.; Portland, 85@90c.; Lynn and Gardiner, $1.05; Newburyport and Bangor, $1.10; Saco, $1.15 and towages; Portsmouth and Bath, 90c. Rates from the further lower ports are 5c. higher.

Birmingham. Aug. 31.

(From Our Special Correspondent.)

The production of coal is increasing. In some quarters there are fears of a car shortage again this winter. State mine inspector J. M. Gray states that the production in Alabama this year will be between 11,000,000 and 12,000,000 tons, as against 10,329,000 and some odd tons last year. The new mines of the Bessemer Land and Improved Company may produce coal before the end of the year. The new mines of the Cahaba Southern Coal Mining Company will be producing coal shortly, while colliery No. 3, in the Pratt mines division of the Tennessee Coal, Iron and Railroad Company is equipped with electrical machinery and will shortly have an increased output. Good prices obtain.

The new contracts between the various mining corporations and the United Mine Workers, including those points decided on by the Board of Arbitration, have been formally signed. The reduction of 13c. per yard on heading or narrow work, except in air courses, has caused some of the miners to revolt, but the great majority are carrying out the letter of their contract. The Sloss-Sheffield Steel and Iron Company, one of the larger coal companies of the district, signed its contract separately. The Board of Arbitration cost the two sides interested, operators and miners, something like $14,000. Judge George Gray, of Delaware, who was chairman of the Board, received $4,000 as his compensation. The other four members of the Board received $2,000 each. The recorder received $400. There were other expenses which were met. The two arbitrators for the miners returned their $4,157 to the organization. The proceedings of this arbitration will be printed shortly in book form.

There is a strong demand for coke, and new ovens are being put in operation. Good prices obtain.

Chicago. Aug. 31.

(From Our Special Correspondent.)

There is something approaching dullness in the anthracite market. Sales are no longer heavy anywhere and the larger houses have their representatives out, actively scouring the country for buyers. Competition is so keen that discounts from the list price probably have been made. The end of the summer sees normal conditions restored, and an indisposition by consumers to keep up the volume of trade desired by the dealers, both wholesale and retail. Apparently there is confidence on the part of everybody using anthracite that there will be no trouble next winter—or else nearly everybody is well supplied. The latter surmise seems disproved by careful estimates of leading dealers, who say that not more than 60 per cent of the consumers have adequate stocks. Small egg is the size most sought, but the supply is good.

The bituminous market is also far from lively. Illinois and Indiana are in best demand, and the supply is better regulated to the needs of the public, preventing the demoralization consequent upon large accumulations of coal upon track. An advance has been made in Indiana block, now quoted at $3.35, against $3.20 last week; lump remains at $3.25@$3.75 and screenings are worth $1@$1.40. The coming of cool weather is expected to stimulate sales of western grades largely, and also of Hocking, which is hardly holding up to its popularity under the advanced price made, and is said to have been sold at cuts of 15 to 25c. in the past week, or at $3.65@$3.75. Smokeless is in very variable condition; there has been something of a surplus which is now largely cleaned up; the circular prices of $3.90 for run-of-mine and $4.35 for lump and egg have been shaded by as much as 50 @60c. on some sales. Youghiogheny is quoted at $3.70 and is in fair and steady demand.

Cleveland. Sept. 1.

(From Our Special Correspondent.)

There has been a much better feeling in the coal trade during the past week. Many of the factories which had been shut down for repairs have resumed and the demand for coal has considerably improved. This has relieved the situation for the producer of steam coal. The market has stiffened, though the situation is not such yet as to warrant any advance in prices. The call for domestic coal is much better and the dealers say that anthracite especially is leading the list. The accumulation of stocks has stopped because the shipment of coal on contracts to the consumers has started rather briskly and about takes up the receipts. The local prices have not been advanced, but the dealers are still talking that way.

The lake situation is somewhat complex. The demand for boats is strong in the ports shipping anthracite coal because those shippers have an ample supply of cars with which to move the material from the mines. The easing in the demand in the eastern field has been a benefit to the lake shippers, who have been able to get all their contracts require. In direct contrast with this situation the bituminous shipping ports have not been able to take their usual number of boats because the receipts have been light, due to a car shortage. The situation is complicated by the condition of the upper lake docks, which are still crowded with coal which cannot be moved. Nevertheless while the shippers are complaining it is fairly certain they have enough coal up the lakes now to prevent high carrying charges this fall. Lake rates hold at 50c. to Lake Michigan and 40c. to Lake Superior.

Pittsburg. Sept. 2.

(From Our Special Correspondent.)

Coal.—The mines are operated as full as transportation facilities permit. Car supply this week is about 60 per cent of the requirements. Demand continues good and prices are firmly maintained except on slack, of which there is now an oversupply, owing to the idleness of some of the mills. The river coal operators sent out 6,000,000 bu. during the week on an unexpected rise in the rivers. About 400 coal boats containing 10,000,000 bu. are at Louisville waiting for a navigable stage in the lower Ohio river for transportation to New Orleans. There have been a number of rumors during the week regarding the Pittsburg Coal Company, but all lack official confirmation. One report is that the Pennsylvania Railroad Company has purchased the real estate of the company, consisting of 160,000 acres of coal land, at the rate of $200 an acre, or $32,000,000 for the properties. The property is leased to the coal company for a long term of years at the annual rental of 4½ per cent on the investment. It is stipulated that the tonnage is to be divided among the Pennsylvania, the Lake Erie and the Baltimore & Ohio railroads. A guarantee is also given to furnish all the cars needed to supply its trade and the Pittsburg Coal Company agrees to increase its annual tonnage from 12,000,000 to 18,000,000 tons. By this deal the Wabash, which is building a line into the Pittsburg district, would be shut out, as far as the coal combine is concerned.

Connellsville Coke.—The coke trade is improving, but prices are lower. Furnace coke is quoted this week at $2.25@$2.50, and foundry at $3@$3.25. The production, according to the last report of the *Courier*, was 244,895 tons, a falling off compared with the previous week of 785 tons. The shipments were 11,938 cars, distributed as follows: To Pittsburg and river tipples, 3,909 cars; to points west of Pittsburg, 6,644 cars; to points east of Connellsville, 1,385 cars. This was a gain of 1,617 cars.

San Francisco. Aug. 28.

(From Our Special Correspondent.)

There is no especial change in the lead market. Demand is light and the trade is quiet. Present prices to dealers for Pacific coast coals are: Roslyn, $7; Wellington, $8; Seattle, $6.50; New Wellington, $8; Beaver Hill, $5.50; Coos Bay, $5.50; Bryant, $6.50; White Ash, $5.25; Richmond, $7.50.

Cargo lots of eastern and foreign coals are quoted per ton as follows: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania anthracite, $14; Cumberland, $13; Cannel, $8.50; Welsh anthracite, $13; Castle Gate, $8.50; Clear Creek, $8.50; Rock Springs, $8.50; Colorado anthracite, $14, Sunnyside, $8.50.

Foreign Coal Trade. Sept. 2.

Messrs. Hull, Blyth & Co., of Cardiff and London, report under date of August 22, that the Welsh coal market continues very firm with prices unchanged. Current quotations are: Best Welsh steam coal, $4.02; seconds, $3.90; thirds, $3.66; dry coals, $3.36; best Monmouthshire, semi-bituminous, $3.36@$3.48; seconds, $3.30; best small steam coal, $2.22; seconds, $2.10; other sorts, $1.92.

The above prices for Cardiff coal are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2 per cent. discount.

The freight market remains quiet and rates are unchanged. Some rates noted are: Marseilles, $1.20; Genoa, $1.08; Naples, $1.08; Las Palmas, $1.38; St. Vincent, $1.50; Rio Janeiro, $2.28; Santos, $2.52; Buenos Ayres, $1.92.

IRON TRADE REVIEW.

New York, Sept. 2.

The iron and steel industries show no important change from last week. It is apparent that prices are about down to hard pan and that buyers are entering the market. Yet there is nothing to indicate any general advance in prices and it is altogether likely that buying for some months, while of greater volume, will be of a hand-to-mouth order, consumers not caring to tie themselves to long contracts. In spite of the recent official cut in prices by Southern furnaces lower prices for Southern iron are reported. In the Pittsburg district a project to curtail the iron output has been discussed. Prices on bessemer, forge and foundry iron are all reported weaker. In finished iron and steel the situation shows little change. Prices generally are fairly firm, and the weak spots are no more pronounced than they have been. Shipments of iron ore from Lake Superior ports are falling off and some mines will not get out much more ore. There are reports that ore has been sold for less than the nominal quotations.

Birmingham. Aug. 31.

(From Our Special Correspondent.)

The sales of pig iron by southern furnacemen continue more active since the recent reduction in prices, though there is still plenty of room for improvement. The furnacemen have requested the railroads to reduce freight rates 50c. per ton and the Southern Iron Committee is to pass on the request. The furnacemen believe that with the freight reduction iron can be sold in competition with Pittsburg furnaces in Pennsylvania, Ohio and Illinois, and that within three or four months the 150,000 tons of accumulated iron in this district can be worked off. The present freight rate on iron from Birmingham to Pittsburg, is $4.85 per ton, and to Cleveland, $4.35. The furnacemen point out that the freight rates advanced 50c. per ton when the iron went above $12, and now that prices are again down to $12 the freight rate ought to fall.

Production is improving. The new furnace of the Alabama Consolidated Coal and Iron Company, at Gadsden, and the No. 2 furnace at Thomas, belonging to the Republic Iron and Steel Company, are both working satisfactorily.

Non-association furnaces are still marketing iron almost as quickly as they are making it, but nothing is heard of iron being sold under the regularly quoted prices, which are: No. 1 foundry, $12.50; No. 2, $12; No. 3, $11.50; No. 4, $11; gray forge, $10.50 to $11; No. 1, soft, $12.50; No. 2, $12.

In finished iron and steel there is nothing new to report. The Bessemer, Gate City and Anniston mills are in operation. The plate department of the Bessemer mills remains quiet. There is much activity at the steel plant of the Tennessee Coal, Iron and Railroad Company. All foundries and machine shops appear busy and proprietors admit that the prospects are very bright.

Chicago. Aug. 31.

(From Our Special Correspondent.)

The iron market is on the up-grade, though progress is slow. Sales of pig iron were somewhat larger than in the previous week, and inquiries predict something like activity soon. Consumers, apparently, must buy, and their expectation of lowerp rices has been checked. At the same time, the $12 Birmingham minimum has been shaded by as much as 50c. on several orders for Southern, making the bottom price so far in Chicago $16.35. There is gossip, indeed, that even $16.15 has been reached on a few sales. Northern furnaces are having less trouble in disposing of their product, at $1 more than Southern. Lake Superior charcoal is in demand at $20.50@$21.

Coke is still abundant and selling at all sorts of prices, with $5 as the general quotation for first-class foundry.

Cleveland. Sept. 1.

(From Our Special Correspondent.)

Iron Ore.—The lake situation is a little easier, due to the lessening of wild ore shipments through all ports. The rates are weak, but have not changed, being based on 80c. from Duluth for wild cargoes. August shipments are estimated to have fallen considerably below last year's. No sales to furnaces are reported, but a few small sales have been made to mills at what are said to have been slightly reduced prices. General quotations are based on $4.50 for bessemer old range and $4 for bessemer Mesaba.

Pig Iron.—The selling of foundry pig has been confined to small lots for immediate delivery, with the price ranging around $16 valley furnace. Some inquiry has come in for contracts which are expected to be closed inside 60 days when a good buying movement is looked for. Southern furnaces have been selling freely on their reduced prices, and the quotation of $12 Birmingham for No. 2 has prevailed. Reports that the independent stacks have been cutting the price cannot be confirmed. The inquiries have been rather brisk for malleable because of agricultural implement works starting up anew and some good sales have been reported for prompt shipment. The price has held about $16.50 in the valley. This line also finds a good strong inquiry for future requirements. At present purchases are on the hand-to-mouth order. There has been some inquiry for bessemer for fourth quarter delivery and the reports have had it that the Steel Corporation is about ready to buy, but these also lack official confirmation. The price holds at $18 in the valley. Basic is off the market and is not quoted except nominally at $18 in the valleys.

Finished Material.—Reports that the price of billets has been cut in this territory are persistent. The association concerns, however, are rigidly adhering to the established quotation of $27.50 Cleveland. The call for steel rails has been much heavier, and electric line projects are rather prolific. The price rules at $28 Pittsburg, unchanged. Bar iron prices have been lowered to about the bottom and the buying, long delayed, has started. Several good sized blocks have been covered during the past week and the price has been about what the consumer wanted to pay. One lot was covered at 1.55c. delivered, with a good stiff freight added. It is said that some of the mills are taking iron contracts upon which they make deliveries of steel bars. The general price, which about represents the market is 1.50c. at the mill. The steel bar sales have been heavier, due to the increased activity among the agricultural implement works. Attempts have been made to break the steel bar prices, but so far without avail. The buying is for spot shipment only, the conservative consumer not wishing yet to cover his needs by contract. The structural situation is fair. The specifications against contracts have been fairly heavy and new orders have been coming in moderately, but there is no great rush of business. The mills are able to make any delivery that is desired. The prices are unchanged at 1.60c. in car lots at the mill and 2:15c. out of stock, in which nothing is being done. The plate trade has not improved, howbeit there are some inquiries which indicate a good business ahead. Prices hold unchanged at 1.60c. Pittsburg.

New York. Sept. 2.

Pig Iron.—The local iron market shows no change. Prices are reported maintained. We quote: No. IX foundry, $17.25@$17.50; No. 2X, $16.50@$17, while No. 2 plain can be had for 50c. less; gray forge, $15.50@$16. For Southern iron, on dock, quotations are: No. 1 foundry, $17; No. 2, $16.25; No. 3, $15.75.

Plates.—The weakness reported West is stated not to affect the local market. Sheared plates are quoted as follows: Tank, ¼-in. and heavier, 1.78@1.85c.; flange, 1.90@2c.; marine, 2.05@2.10c.

Bar Iron and Steel.—Prices for large lots on dock are: Refined bars, 1.70@1.90c.; soft steel bars, 1.75@1.80c.

Steel Rails.—The quotations remain $28 for standard sections, f. o. b. mills; light rails, $33@$36, according to weight. Relaying rails are $28@$33 for heavy sections and $33@$38 for light sections.

Structural Material.—Demand is still light. For large lots at tidewater, nominal quotations continue 1.75@2c. for beams, angles, channels and tees.

Philadelphia. Sept. 2.

(From Our Special Correspondent.)

Pennsylvania pig iron makers and dealers are anxiously awaiting the wave of improvement. The volume of pig iron business in this market has been disappointingly light, and the only encouraging feature is that a few of the larger consumers have offered to take iron at a price they have named, but the kind of iron they want is not particularly abundant and the holders of it are not anxious enough to sell for the price offered. There is a general holding up all through eastern Pennsylvania among buyers, especially of foundry irons. Two or three big sales of basic came near taking place, but a hitch of some kind occurred. The only business in forge iron that has been of trifling volume and there appears to be little disposition among mill men to take any risks. The foundrymen especially want to see their way clearer. Most of them have iron enough due them to see them through whatever urgent work they happen to have. The general notion here among buyers is that the bottom level of prices has not been struck. Makers especially of a certain number of well-known brands pretend to hold a very different opinion. Quotations may be given at $18@$18.50 for No. 1 X foundry; $17@$17.50 for No. 2 X; $16.50 for best No. 2; $16 @$16.25 for standard mill. Two or three ordinary lots of ordinary mill went at $15.25 to-day; basic is quoted at $16.

Steel Billets.—While there are many inquiries there is very little actual business. Foreign steel is still offered at $27.50, but the offer finds no takers.

Merchant Bar.—Bar iron continues to drag, at the same time the store keepers say they find no difficulty in keeping up the usual retail sales. It is the mill men who are complaining and their chief complaint is that they are not catching very many big orders. The tendency of the market is apparently down. The chief inquiry this week has been for common iron; steel bars are held firmly at regular prices.

Sheets.—Nearly all of this week's business has been in heavy sheets.

Pipes and Tubes.—The tube mills are doing a fair business, chiefly made up of rather small lots. Buyers are not anxious.

Plate Iron.—Two or three of the plate mills have been attempting to land some business within a few days; it is understood the negotiations involve a good deal of material and the mills are naturally anxious to get it. Quotations are a secret, for on small lots ordered where quick deliveries are required there is no shading.

Structural Material.—The makers of structural material say that considerable business is in sight. The ordinary quotations are 1.73½@1.80 in car lots, but the recent business in smaller lots shows that higher prices are paid.

Steel Rails.—The only stir in the rail situation in Pennsylvania mills is as to the probable quotations that will be finally named on several good sized orders for girder rails. Standard rails are of course held very firm.

Old Rails.—A few users are anxious to secure some stock, but they are not willing to pay $20, and believe they will yet do better.

Scrap.—There has been scarcely any movement in scrap for two or three weeks. Holders are making no effort whatever to get rid of what they have and say scrap will be worth more money in 30 days. Country scrap sold this week at $16.50 and machinery scrap at $15.50; there are some buyers for heavy steel scrap but there is a hitch in the negotiations. The average price is $17.50.

Pittsburg. Sept. 1.

(*From Our Special Correspondent.*)

The expected brightening of the iron and steel markets has not materialized and conditions show little improvement. Prices in finished lines continue firm, but in pig iron there is a gradual weakening and still lower prices are named. It was reported late last week that an agreement had been made to bank all furnaces in the Pittsburg district and the valleys for a period of 30 days. Investigation showed that while the report was not true, a plan for curtailing production to prevent a further decline in prices is approved by some furnace interests. There are now about 12 furnaces out for repairs, and nearly as many more are scheduled to go out of blast within the next two weeks for relining. Some may not resume unless the market improves. The lowest price for Bessemer pig iron has been reached in a sale of one lot of 500 tons at $16.50, valley furnaces. Forge and foundry iron prices also are lower than a week ago, but only a few small sales were made. Southern furnaces are making a concession of 25c. on the official price of $12, Birmingham, for foundry No. 2 on any good tonnage offered. This is equivalent to $16.60 delivered at Pittsburg. Two inquiries of 500 tons each are in the market and may be closed at that figure, domestic foundry being held at a slightly higher price. The local foundries are still running on iron bought at a higher price than is now quoted, but are expected to come into the market in a short time. A little forge has been sold during the week at about $15.60, Pittsburg. The scrap market has been dull for a month or two but within the last few days it has shown signs of improvement. Heavy melting stock has been offered as low as $16, but a sale of 5,000 tons has been made at $16.75, Pittsburg, to an eastern mill. Several car-loads of sheet scrap have been sold at about $14 and there has been some buying in ordinary rolling mill scrap. There is no inquiry for pig iron for the last quarter and there is not likely to be until the market is more settled. It seems to be the impression that the lowest prices of the year are being quoted.

There is more activity in billets and a number of sales are reported, but buyers are only placing orders for immediate requirements and the total tonnage is not large. All sales were made at the agreed price of $27. Pittsburg, Wheeling and the valleys, and it is reported that some concerns that are not parties to the agreement have received a slightly higher price. Sheet bars and open hearth billets sell at $1 a ton above bessemer billets. Considerable new business in merchant steel bars is being received; the mills are all busy and the official price is firmly held. There is a lull in the demand for plates as orders for steel cars have fallen off during the past few weeks. It was reported late last week that the Allegheny plant of the Pressed Steel Car Company would close for an indefinite period on September 15, but the company stated yesterday that specifications were coming in more satisfactorily and that the works would continue in operation. The tinplate mills are running full, but little new business is being received as the busy season is nearly over. The official price remains at $3.80 a box, but in a few instances a premium is paid for prompt delivery.

A special convention of representatives of 27 sheet mill lodges of the Amalgamated Association of Iron, Steel and Tin Workers began yesterday and is still in session. The object is to consider plans for the relief of idle members. One proposition is to declare open all non-union mills, and another is to remove the limit of production. The sentiment seems to be in favor of the latter. It was reported that at a number of union plants the scale is being violated and members of the association in order to hold their positions are working the mills to their full capacity. The open mill plan, it is said, will not be adopted. No decision has yet been reached.

Pig Iron.—While the furnaces are quoting bessemer pig iron at $17, valley, one sale of 500 tons is reported at $16.50. There have been no inquiries for fourth quarter delivery and it is not likely that any active buying will be done for some time. Sales of gray forge have been made as low at $15.60, Pittsburg, and a few small lots have brought a higher price. Foundry No. 2 is quoted at $16.75@$17, Pittsburg.

Steel.—A number of small sales of bessemer steel billets were made within the week, but the total tonnage is less than 2,000 tons. Sheet bars and open hearth billets are quoted at $1 above bessemer billets, but few sales of any consequence were made. Steel bars and plates are still quoted at 1.60c.

Sheets.—The sheet market is in a little better shape than it has been, but all of the mills are not running. A good fall business is expected. Black sheets No. 28 gauge are still quoted at 2.75c. and galvanized at 3.85c. On a desirable order a concession of 5c. a hundred pounds might be obtained.

Ferro-Manganese.—There is but little change in the market, and both domestic and foreign 80 per cent is quoted at $48@$50.

Cartagena, Spain. Aug. 15.

(*Special Report of Barrington & Holt.*)

Iron and Manganiferous Ores.—There have been no exports from this port during the week. Business continues extremely dull and with the stiff freights at present ruling it looks af it very little ore will be shipped within the next few weeks. Therefore the output is being reduced as much as possible.

Prices are firm at 6s. 9d.@7s. per ton, f. o. b. shipping port, for ordinary 50 per cent ore; 7s. 3d.@7s. 9d. for special low phosphorous; 9s. 3d. for 58 per cent specular ore. Magnetic ore, 60 per cent iron, is 11s. 6d. for lump and 9s. 6d. for smalls. Manganiferous ores range from 14s. 6d. for 20 per cent manganese and 20 iron to 9s. 9d. for 12 manganese and 35 iron.

Pyrites.—Iron pyrites 40 per cent iron and 43 per cent sulphur are quoted at 10s. 6d. per ton, f. o. b., Cartagena.

CHEMICALS AND MINERALS.

New York, Sept. 3.

The opening days of September show a slow awakening from the summer dullness, though there are indications in various branches of trade that promise activity in the fall.

Raw materials are firmer, owing to the scarcity of spot supplies and the control which governs future shipments, especially of nitrate of soda and brimstone.

Manufactured goods are freely offered for prompt shipment as an attempt is being made to clean up stocks, preparatory to booking new contracts for next year's delivery. As yet heavy chemical manufacturers seem unwilling to contract on basis of present low prices, expecting an increased demand and a more favorable market in future. Consumers on the other hand, however, are not anxious to force the situation, and so show a disinterested feeling, believing no doubt that the keen competition among manufacturers will keep prices down.

The imports of chemicals and minerals into the United States in the seven months ending July 31 included the following. The figures are in pounds, unless otherwise stated:

	1902.	1903.
Cement, lbs.	227,685,450	571,660,042
Asphalt, tons	72,336	82,101
Chlorate of potash	774,075	268,791
Muriate of potash	36,772,918	69,974,171
Saltpeter	8,015,864	9,613,274
All other potash	33,017,868	34,495,740
Caustic soda	2,136,579	1,736,816
Sal soda	2,249,684	2,070,583
Soda ash	16,210,477	12,433,866
All other soda, except nitrate	9,524,328	9,982,831
Graphite, tons	11,937	10,654
Salt, lb.	212,501,423	182,712,324

Notable increases this year were 343,974,592 lb. cement, chiefly from Belgium and Germany, 33,191,253 lb. muriate of potash from Germany, and 9,765 tons asphalt, principally from Trinidad. Decreases were mostly in heavy chemicals and salt, chiefly from Great Britain.

Cyanide of Potassium.—Quiet rules in this market, and there is no difficulty to obtain supplies at a fraction under 20c. per 100 lbs., though this is the general market quotation.

Bleaching Powder.—Manufacturers and importers are still undecided what prices to quote on forward contracts. The situation reminds consumers of cross-sword play, each antagonist awaiting the first move of his opponent before deciding what step shall be taken to improve the status of the market. It appears that manufacturers, particularly those having electrolytic works, are determined to control the situation, while, on the other hand, the old process plants are endeavoring in every possible way to hold their regular customers, even at a sacrifice of certain profits. Consumers are interested spectators, enjoying the benefit of this competition by receiving their supplies of bleaching powder at the lowest prices on record. Momentarily there is a pressure to sell spot stocks at $1.10@$1.12½ per 100 lbs. for foreign bleach, f. o. b. New York. Domestic makers hold for 87½c.@1.05 f. o. b. works. but sales are too small to attract attention

Imports of bleaching powder into the United States in July were 7,679,010 lb., making a total since January of 66,010,207 lb., which is 5,937,127 lb. less than the corresponding seven months of 1902. The decrease is wholly in Continental bleach, as British manufacturers are steadily gaining this market, although domestic makers have become keen competitors.

Copper Sulphate.—There is a strong undercurrent in this market, and sellers have raised their views to $4.75@$4.80 per 100 lbs., f. o. b. works. Business, however, is small, and the only reason for the advance in price is the limited supplies.

Exports of copper sulphate from the United States in July were 221,538 lm., making 16,997,797 lb. for the seven months. Compared with the corresponding period last year there is a decrease of 12,358, 575 lb., owing chiefly to smaller buying by Italy, Austria and France.

Acids.—Trade is normal, and prices are generally unchanged.

We quote as below, per 100 lbs., unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity:

Muriatic, 18°	$1.50	Oxalic, Com'l..	$5.00@$5.37½
Muriatic, 20°	1.00	Sulphuric, 50°,	
Muriatic, 22°	1.75	bulk, ton	13.50@14.50
Nitric, 36°	4.37½	Sulphuric, 60°	1.05
Nitric, 38°	4.75	Sulphuric, 60°,	
Nitric, 40°	5.00	bulk, ton	18.00@20.00
Nitric, 42°	5.37½	Sulphuric, 66°	1.20
		bulk, ton	21.00@23.00

Brimstone.—The future position of brimstone, if we may judge from importers' quotations on shipments, looks stronger. A better understanding of the status of the trade can be gotten from the article which appears on another page of this issue. Spot supplies of brimstone are very small, and sellers find no trouble in obtaining $23 per ton. Shipments are held at $22.25@$22.50. Best thirds are nominally $1 less than seconds.

In July the United States imported 13,938 tons of crude brimstone, as against 5,998 tons last year. Since January the receipts total 112,413 tons, which is an increase of 16,501 tons as compared with 1902, owing to the larger consumption of best unmixed seconds by the sulphite pulp manufacturers.

Pyrites.—Importations show a slight falling off, as consumers are pretty well supplied for a time at least. Prices continue firm.

Imports of pyrites into the United States in July were 46,413 tons, which is 14,844 tons more than was reported a year ago. In the seven months ending July 31 the imports amounted to 246,210 tons, containing approximately 115,719 tons sulphur. Compared with the corresponding period last year there is a decrease of 4,353 tons in the imports of pyrites. It should be mentioned that there were no re-exports this year, while in 1902 the quantity was 3,060 tons, indicating that the imports entered for consumption this year were only 1,293 tons less than 1902.

We quote: Domestic pyrites, $5 per ton for lump ore, f. o. b. Atlantic coast mines, and 10c. per unit for fines; sulphur content varies from 42@44 per cent. Spanish pyrites carrying from 46@52 per cent sulphur, are quoted at 11@12c. per unit for lump and 10 @10½c. for fines delivered at Atlantic ports.

Nitrate of Soda.—The shortage in spot supplies and limitation in future arrivals, caused renewed strength in the market here. Spot is held at $2.25 per 100 lbs., to arrive, at $2.10, and futures at $2.05.

The consumption of nitrate of soda in the United States eclipses previous years. In the seven months ending July 31 the imports totaled 156,443 long tons, as against 106,395 tons in 1902 and 120,557 tons in 1901. Credit for this growth is largely due to the energetic propagation among agriculturists, who are learning more and more about the merits of nitrate of soda as a fertilizer.

Sulphate of Ammonia.—Foreign gas liquor is firmer at $3.07½ per 100 lbs. for shipment, and domestic, $3.05.

Phosphates.—This is the month when the larger superphosphate manufacturers place their season contracts for phosphates, and already some good orders have been booked by exporters. In all quarters the tendency is for higher prices, and it seems likely that next year's business will be done on a firmer basis.

Exports from the United States in July are reported at 57,896 long tons, which is considerably less than a year ago. In the seven months ending July 31 the shipments amounted to 430,198 tons, against 456,416 tons in 1902, showing a decrease of 26,218 tons this year. On the other hand, imports have increased to 90,276 tons from 49,088 tons in 1902.

Phosphates.	Per ton. F. o. b.	United Kingdom or European ports. Unit.	Long ton.
*Fla. hard rock (77@80%).	$7.00@$7.50	6¾@7⅝d.	$10.53@11.70
*Fla. land peb. (68@73%).	3.50@ 3.75	5½@5¾d.	7.70@ 8.05
†Tenn. (78@82%) export.	4.00@ 4.25	6½@7d.	10.40@ 8.05
†Tenn. 78% domestic.	3.75@ 4.00	.....	.....
†Tenn., 75% domestic.	3.50	.....	.....
†Tenn., 73@74% domestic.	2.95@ 3.20	.....	.....
†Tenn., 70@72% domestic.	2.70@ 2.95	.....	.....
‡So. Car. land rock.	...@ 3.25	.....	.....
‡So. Car. riv. r'k (55@60%)	2.75@ 3.00	4⅝@5½d.	5.55@ 6.60
Algerian (63@70%).	.....	5½@6¼d.	7.37@ 8.38
Algerian (58@63%).	.....	4⅝@5⅝d.	5.55@ 6.90
Gafsa (Tunis)	.....	5¼@6d.	6.30@ 7.20
Christmas Isl. (80@85%).	.....	7¼@7¾d.	12.04@12.87

*Fernandina, Tampa, Brunswick, Savannah or Port Inglis.
†Mt. Pleasant. ‡On vessels, Ashley River.

Liverpool. Aug. 25.

(*Special Report of Joseph P. Brunner & Co.*)

There is a quiet but steady demand for most lines of heavy chemicals without any special feature of interest.

Copper Sulphate has been advanced to £20 per ton f. o. b. here for late this year and spring delivery.

Soda Ash.—For tierces the nearest values are about as follows: Leblanc ash, 48 per cent, £5@£5 10s.; 58 per cent, £5 10s.@£6 per ton net cash; ammonia ash, 48 per cent, £4 5s.@£4 10s.; 58 per cent, £4 15s. per ton net cash; bags, 5s. per ton under price of tierces.

Soda Crystals are in fair request at generally £3 7s. 6d. per ton, less 5 per cent for barrels or 7s. less for bags; with special terms for a few favored markets.

Caustic Soda is in moderate supply and held for full prices, as follows: 60 per cent, £8 15s.; 70 per cent, £9 15s; 74 per cent, £10 5s.; 76 per cent, £10 10s. per ton, net cash.

Bleaching Powder is neglected on spot, and £3 10s. @£4 per ton, net cash, represents the range for hardwood, as to market.

Chlorate of Potash is idle, at 2¾@2⅞d. per lb. for English make.

Bicarb Soda is selling fairly well at £6 15s. per ton, less 2½ per cent for good gray 24@25 per cent in kegs, with usual allowances for larger packages, also special terms for a few favored markets.

Sulphate of Ammonia is firmer and quotations are about £12 8s. 9d.@£12 10s. per ton, less 2 per cent for good gray 24@25 per cent in double bags f. o. b. here.

Nitrate of Soda is steady on spot at £10@£10 5s. per ton, less 2½ per cent for double bags, f. o. b. here, as to quality.

METAL MARKET.

New York, Sept. 2.

Gold and Silver Exports and Imports,

At all United States Ports in July and Year.

Metal	July. 1902.	July. 1903.	Year. 1902.	Year. 1903.
Gold:				
Exports	$7,884,339	$9,117,758	$28,160,576	$40,453,999
Imports	1,594,421	4,631,217	14,781,765	18,607,271
Excess	E. $6,289 918	E. $4.486,541	E.$13,378,811	E. 21,846,728
Silver:				
Exports	$3,671,814	$3,015,426	$26,199,848	$20,520,765
Imports	2,276,480	2,564,217	14,497.218	12,545,511
Excess	E. $1,395,334	E. $451,209	E.$11,702,630	$7,975,254

These exports and imports cover the totals from all United States ports. The figures are furnished by the Bureau of Statistics of the Treasury Department.

Gold and Silver Exports and Imports, New York.

For the week ending September 2, and for the years from January 1:

Period.	Gold. Exports.	Gold. Imports.	Silver. Exports.	Silver. Imports.	Total Excess, Exports or Imports.
Week..	$19,958	$13,545	$267,080	$22,680	E. $250,813
1903....	32,194 707	3,718,375	13.853,255	1,689,717	E- 40,639,870
1902....	24,513,808	1,658,762	16,951,505	825,694	E. 38,980,857
1901....	25,801.839	2,119,466	21,948,074	2,635,006	E. 42,995,441

The silver exported went to London; gold to France. Imports were from South and Central America.

General business continues quiet, but prospects are improving as the labor troubles, especially in the building trades, are gradually being adjusted so that disturbances to industrial enterprises from this cause in the fall are less likely to occur. Of course, it would be injudicious to prophecy the labor outlook for next year, as developments must decide the situation. The speculative markets, sensitive to all local or national happenings of importance, have displayed a pronounced quiet this week, as little interest is being manifested by the public.

The statement of the New York banks, including the 56 banks represented in the Clearing House, for the week ending August 29, gives the following totals, comparisons being made with the corresponding weeks of 1902 and 1901:

	1901.	1902.	1903.
Loans and discounts	$895,186,600	$910,040,000	$923,111,500
Deposits	968,121,900	935,988,500	920,123,900
Circulation	30,097,400	32,935,100	43,918,400
Specie	176,791,400	167,427,000	174,997,900
Legal tenders	77,159,000	76,315,400	75,711,000
Total reserve	$253,950,400	$243,742,400	$250,708,900
Legal requirements	242,030,475	233,999,625	230,030,975
Balance surplus	$11,919,925	$9,732,775	$20,677,925

Changes for the week, this year, were increases of $5,166,600 in loans and discounts, $6,341,900 in deposits, $818,700 in specie, and $386,400 in legal tenders; decreases of $49,600 in circulation and $380,375 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparisons made with the holdings at the corresponding date last year:

	1902. Gold.	1902. Silver.	1903. Gold.	1903. Silver.
N.Y. Assoc.	$167,427,000	.....	$174,997,900	.....
England	189,640,690	.....	180,507,735	.....
France	524,981,785	$224,509,570	511,234,425	$224,297,940
Germany	188,115,000	69,580,000	180,565,000	63,440,000
Spain	71,155,000	97,800,000	73,120,000	100,725,000
Nethl'ds	23,709,000	33,158,000	19,712,500	32,455,000
Belgium	15,850,335	7,926,665	14,203,335	7,351,690
Italy	80,525,000	10,426,000	95,980,000	11,494,000
Russia	372,805,000	44,600,000	406,235,000	43,880,000
Austria	225,710,000	62,840,000	227,140,000	64,195,000

The returns of the Associated Banks of New York are of date August 29 and the others August 27, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

Inquiry for silver has carried up price quite rapidly and at the advance the demand is good and the market closes steady.

The United States Assay Office in New York reports receipts of 21,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to August 20 are reported by Messrs. Pixley & Abell's circular as follows:

	1902.	1903.	Changes.
India	£4,077,835	£3,736,475	D. £341,360
China	135,850	279,111	I. 143,261
Straits	94,550	678,479	I. 583,929
Total	£4,308,235	£4,694,065	I. £385,830

Receipts for the week were £106,000 in bar silver from New York, and £10,000 from Australia; total, £116,000. Shipments were £80,450 in bar silver to Bombay, and £2,500 to Colombo; also £15,200 in Mexican dollars to the Straits; total, £98.150.

Indian exchange continues strong at 16d. per rupee, owing to the good demand for Council bills in London and the urgent request for money in India, as a result of the heavy movement in produce.

The coinage executed at the mints of the United States in August is reported by the Bureau of the Mint, Treasury Department, as below:

Denomination.	Pieces.	Value.
Eagles	45,000	$450,000.00
Total gold	45,000	$450,000.00
Dollars	74,000	74,000.00
Half-dollars	240,000	120,000.00
Quarter-dollars	432,000	108,000.00
Dimes	1,500,000	150,000.00
Total silver	2,246,000	$452,000.00
Five cents	2,922,000	146,100.05
One cent	6,608,000	66,080.00
Total minor	9,530,000	$212,180.00
Total coinage	11,821,000	$1,114,180.00

In addition to the above there were coined for the Philippines 2,004,000 pesos; 1,600,833 50-centavos; 2,351,224 20-c., and 3,501,821 10c.; total, 9,456,878 pieces. Also 200,000 5-Bolivars for the Venezuelan Government.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	$0.44	$0.46
Peruvian soles and Chinese pesos	.40	.44
Victoria sovereigns	4.86	4.88
Twenty francs	3.86	4.88
Spanish 25 pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

Aug.-Sept.	Sterling Exchange.	Silver—N. Y. Cts.	Silver—London Pence.	Copper—Lake, Cts. per lb.	Copper—Electrolytic, Cts. per lb.	Copper—London, £ per ton.	Tin, Cts. per lb.	Lead, Cts. per lb.	Spelter—N. Y., Cts. per lb.	Spelter—St. Louis, Cts. per lb.
27	4.85⅞	56	25⅛	13⅜ @13⅝	13¼ @13½	58¼	27¾	4.05 @4.10	5.70 @5.75	5.52½ @5.57½
28	4.8590	56¼	26	13⅜ @13⅝	13¼ @13½	58¼	27½	4.05 @4.10	5.70 @5.75	5.52½ @5.57½
29	4.8595	56¾	26¼	13⅜ @13⅝	13¼ @13½	....	27¼	4.05 @4.10	5.70 @5.75	5.52½ @5.57½
31	4.8595	57⅛	26¾	13⅜ @13⅝	13¼ @13½	59	27	4.05 @4.10	5.70 @5.75	5.52½ @5.57½
1	4.86	57⅝	26⅝	13⅜ @13⅝	13¼ @13½	59½	27	4.05 @4.10	5.70 @5.75	5.52¼ @5.57½
2	4.86¼	57¾	26⅛	13⅜ @13⅝	13¼ @13½	58½	26⅞	4.05 @4 10	5.70 @5.75	5.52½ @5.57½

London quotations are per long ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars: the price of electrolytic cathodes is usually 0.25c. lower than these figures.

Copper.—The market has ruled quiet but steady throughout the week, a fair volume of business being transacted. Quotations are unchanged at 13⅜@13⅝c. for lake; 13¼@13½c. for electrolytic in cakes, wirebars or ingots; 13@13¼c. for cathodes and 12¾@13c. for casting copper.

The market for standard copper in London closed last week at £58 5s., and opened on Monday at £59, the closing quotations on Wednesday being cabled as £58 10s.@£58 12s. 6d. for spot and £57 15s.@£57 17s. 6d. for three months.

Statistics for the second half of August show a decrease in the visible supplies of 300 tons.

Refined and manufactured sorts we quote: English tough, £63@£64; best selected, £63 10s.@£64; strong sheets, £72@£73; India sheets, £69@£70; yellow metal, 6⅜@6½d.

Exports and imports of copper at New York, Philadelphia and Baltimore in the week of September 1 and for the year to date, were in long tons:

Exports—	Week.	Year.
Austria	...	3,622
Belgium	65	1,002
France	881	13,431
Germany	305	16,729
Holland	1,393	25,439
Italy	10	1,866
United Kingdom	697	11.338
Other countries	105	3,805
Total copper	3,456	77,232
Matte	...	286
Imports—		
Copper	405	17,725
Matte	...	984
Ore	...	26,587

Exports have been good, particularly to France. Imports, on the other hand, are small.

Imports of copper into the United States in all forms, with re-exports of foreign copper, are reported by the Bureau of Statistics, Treasury Department, as below, for the seven months ending July 31, the figures being in long tons, of 2,240 lb.:

Fine Copper:	1902.	1903.	Changes.
Imports	19,226	34,351	I. 15,125
Re-exports	3,118	934	D. 2,184
Net imports	16,108	33,417	I. 17,309
Ores and Matte:			
Imports	63,905	146,122	I. 82,217
Re-exports	9,082	4,061	D. 5,021
Net imports	54,823	142,061	I. 87,238

As ores and matte are not reported separately, it is not possible to give the fine copper content closely. Estimating as nearly as possible, however, we find that the total net imports of copper in all forms this year were approximately equivalent to 39,905 tons of fine copper.

Of the fine copper imported this year 23,212 tons came from Mexico and 4,612 tons were from Great Britain. Of the imports of ores and matte, 120,189 tons came from Canada, being mostly British Columbia ore, shipped to the Northport and other smelters.

Exports of domestic copper, in all forms, from the United States are reported by the Bureau of Statistics as below, in long tons, for the seven months:

	1902.	1903.	Changes.
Fine copper	102,351	72,278	D. 30,073
Ores and matte	11,983	7,163	D. 4,820

Again, estimating the ores and matte, we find the exports in all forms were approximately equivalent to 74,621 tons fine copper, as against 107,821 tons in 1902; a decrease of 32,700 tons, or 30.5 per cent, this year.

Tin has had a declining tendency, but at the lower values established there is a somewhat better inquiry. The closing quotations are given as 26⅞@27c. for spot; 26⅝@26¾c. for September; 26½c. for October.

The foreign market, which closed last week at £125, declined £2 on Monday, but on Tuesday scored an advance of £1, upon the publication of the monthly statistics, which showed a decrease in the visible supplies of 800 tons. The closing quotations are cabled as £122 12s. 6d.@£122 15s. for spot, and £121 12s. 6d. @£121 15s. for three months prompt.

Imports of tin into the United States for the seven months ending July 31 are reported as below, in long tons of 2,240 lb.:

	1902.	1903.	Changes.
Straits	12,785	14,018	I. 1,233
Australia	135	152	I. 17
Great Britain	8,665	8,258	D. 407
Holland	801	642	D. 159
Other countries	345	326	D. 19
Totals	22,731	23,396	I. 665

The receipts from Great Britain are chiefly Straits tin; those from Holland are Banka and Billiton tin. The increase this year was principally in Straits tin.

The exports of foreign tin from the United States in the seven months amounted to 339 tons, as against 291 tons in 1902; showing an increase of 48 tons.

Visible stocks of tin on September 1 are reported as follows, in long tons, of 2240 lb.:

	Store.	Afloat.	Totals.
U. S., except Pacific ports	2,029	1,635	3,664
Great Britain	5,991	4,415	10,406
Holland	1,936	538	2,474
Totals	9,956	6,588	16,544

The total compares with 16,507 tons on August 1, and 16,293 tons September 1, 1902, showing an increase over both periods.

Lead is in good demand. The ruling quotations are 4@4.02½c. St. Louis, and 4.05@4.10c. New York.

The foreign market is dull, Spanish lead being quoted £11 2s. 6d.@£11 3s. 9d., and English lead £11 5s.@£11 6s. 3d.

Imports of lead into the United States with re-exports of foreign metal, are reported as below by the Bureau of Statistics of the Treasury Department, for the seven months ending July 31; the figures are in short tons of 2,000 lb.:

	1902.	1903.	Changes.
Lead, metallic	2,157	360	D. 1,797
Lead in ores and base bullion	61,779	61,312	D. 467
Total imports	63,936	61,672	D. 2,264
Re-exports	49,974	47,406	D. 2,568
Balance	13,962	14,266	I. 304

Of the imports this year 54,805 tons, or 88.8 per cent, of the total were from Mexico, and 5,587 tons, or 9.1 per cent, from Canada. The balance over re-exports, shown above, is not consumed here as a rule; most of it is retained in bond, for future export. In addition to the re-exports given, there were 49 tons of domestic lead exported this year, against 3,168 tons in 1902.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of August 15, that the price of silver during the week has been 13.75 reales per oz. Exchange has gone up 8 centimos, to 34.43 pesetas to £1. The local quotation for pig lead on wharf has been 61.50 reales per qtl., which on above exchange is equivalent to £10 per long ton, f. o. b., Cartagena. Exports of pig lead were 501,361 kgs. to Marseilles.

Spelter remains quiet but firm, without any special feature. The ruling quotations are 5.52½@5.57½c. St. Louis, and 5.70@5.75c. New York.

The foreign market is strong, good ordinary being quoted at £21, and special £21 5s.

Exports of spelter from the United States for the seven months ending July 31 were 1,140 short tons, as against 2,882 tons last year; a decrease of 1,742 tons. Exports of zinc ore, chiefly to Belgium, were 23,625 tons, against 25,752 tons in 1902, a decrease of 2,127 tons.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of August 15, that the exports for the week were 2,000 tons blende and calamine to Antwerp.

Antimony is unchanged, Cookson's at 7@7¼c.; Hallett's, 6⅞c.; United States, Italian and French, 6c., and Japanese, 5¾c.

Imports of antimony into the United States for the seven months ending July 31 are reported as below, in pounds:

	1902.	1903.	Changes.
Metal and regulus	3,187,583	3,757,779	I. 570,196
Ore	260,127	2,012,902	I. 1,752,775

The substantial increases this year are attributed chiefly to the heavier receipts of ores from Japan and other countries.

Re-exports of foreign metal this year were 65,805 lb., against 18,674 lb. in 1902; while no ore was re-shipped, although last year 208,531 lb. had been sent abroad.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per lb.

Exports of nickel, nickel oxide and matte from the United States for the seven months ending July 31, were 1,496,738 lb., as against 1,663,427 lb. in 1902; a decrease of 166,689 lb. this year. In July, the first month for which returns have been tabulated, the imports amounted to 946 tons.

Platinum.—Consumption continues good, and prices are firm. Ingot platinum in large lots brings $19 per oz. in New York.

Imports of platinum into the United States in the seven months ending July 31 were 4,957 lb., as against 4,555 lb. in 1902; an increase of 402 lb.

Quicksilver.—The New York price is unchanged at $47.50 per flask for large lots, with a slightly higher figure quoted for small orders. The San Francisco quotations are still $44.50@$46 per flask for domestic orders and $42@$43 for export. The London price is £8 10s. per flask, with the same quotation asked by second hands.

Exports of quicksilver from the United States in the seven months ending July 31 amounted to 759,673 lb., as against 403,257 lb. in 1902; an increase of 356,416 lb.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

Aluminum	Per lb.
No. 1. 99% ingots	33@37c.
No. 2. 90% ingots	31@34c.
Rolled Sheets	4c. up
Alum-bronze	20@23c.
Nickel-alum	33@39c.
Bismuth	$2.10
Chromium, pure (N. Y.)	80c.
Copper, red oxidd	50c.
Ferro-Molyblu'm (50%)	$1.25
Ferro-Titanium (10)	90c.
Ferro-Titanium (20@25% N. Y.)	55c.

	Per lb
Ferro-Tungsten (37%)	38c.
Magnesium, pure (N. Y.)	60c.
Magnesium	$2.75
Mangan'e Cop. (20% Mn)	32c.
Mangan'e Cop. (30% Mn)	38c.
Molybdenum (Best)	$1.82
Phosphorus, foreign	45c.
Phosphorus, American	70c.
Sodium metal	50c.
Tungsten (Best)	62c.

Missouri Zinc Ore Market. Aug. 29.

(From Our Special Correspondent.)

The highest price for zinc during the week was $40 per ton. The assay basis continues at $35@$37 per ton of 60 per cent. zinc, but in a few instances prices were stretched a point. The market showed more competition than for a number of weeks. Lead advanced $1.50 per ton, closing steady and in excellent demand at $54. A year ago zinc brought $39.50 and lead only $49 per ton. When the powder situation became easy the local works were a second time wrecked by an explosion that killed four men and will put the works out of the market for a month. However, supplies are more liberal. A threatened strike among the coal miners is causing mine operators no little uneasiness, and all of those who can obtain are putting in an extra supply of fuel. The showing for eight months is excellent, the values recording an increase of $350,660 over the eight months of last year. Zinc has averaged $34.33 and lead $53.90 per ton, against a shade under $30 for zinc and $45.41 for lead during a like period of 1902. The highest price of zinc was $42 per ton, the same as last year, while the highest price for lead was $60.50 and only $50 last year.

Following are the shipments of zinc and lead from the various camps of the Joplin district for the week ending to-day:

	Zinc, lbs.	Lead, lbs.	Total value.
Joplin	2,952,170	323,650	$64,835
Webb City-Carterville	1,828,580	321,350	41,490
Galena-Empire	840,190	84,430	16,930
Duenweg	589,920	153,450	14,980
Alba-Neck	611,170	38,030	12,930
Zincite	425,290	6,360	8,035
Oronogo	453,730	2,230	8,070
Aurora	486,340	.....	7,060
Carthage	218,310	43,880	5,310
Badger	195,140	9,340	3,685
Granby	230,000	30,000	3,110
Carl Junction	157,820	.....	3,000
Central City	150,050	7,820	2,785
Mitchell	130,370	.....	2,485
Cave Springs	96,620	12,270	2,105
Prosperity	40,000	45,890	1,975
Spurgeon-Spring City	59,620	35,270	1,950
Stotts City	66,000	.....	1,250
Diamond	65,580	.....	1,180
Total sales	9,596,900	1,111,970	203,170
Eight months	330,728,440	38,826,610	$6,724,125

Values: Zinc, the week, $173,315; 35 weeks, $5,677,905; lead, the week, $29,855; 35 weeks, $1,046,220.

Average Prices of Metals per lb., New York.

Month.	Tin.		Lead.		Spelter.	
	1903.	1902.	1903.	1902.	1903.	1902.
January	28.33	23.54	4.075	4.000	4.865	4.27
February	29.43	24.07	4.075	4.075	5.043	4.15
March	30.15	26.32	4.442	4.075	5.349	4.28
April	29.81	27.77	4.567	4.075	5.550	4.37
May	29.51	29.85	4.325	4.075	5.639	4.47
June	28.34	29.36	4.210	4.075	5.697	4.96
July	27.68	28.38	4.075	4.075	5.662	5.27
August	28.29	28.23	4.075	4.075	5.725	5.44
September	.....	26.60	.....	4.075	.....	5.49
October	.....	26.07	.....	4.075	.....	5.38
November	.....	25.68	.....	4.075	.....	5.18
December	.....	25.68	.....	4.075	.....	4.78
Year	.....	26.79	.....	4.069	.....	4.84

NOTE.—The average price of spelter in St. Louis for the month of January, 1903, was 4.689c. per lb.; for February, 4.681c.; for March, 5.174c.; for April, 5.375c.; for May, 5.469c.; for June, 5.537c.; for July, 5.507c; August, 5.55c.

Average Prices of Copper.

Month.	New York.				London.	
	Electrolytic.		Lake.		Standard.	
	1903.	1902.	1903.	1902.	1903.	1902.
January	12.159	11.053	12.361	11.322	53.52	48.43
February	12.778	12.173	12.901	12.378	57.34	55.16
March	14.416	11.882	14.572	12.188	63 85	53.39
April	14.454	11.618	14.642	11.886	61.72	52.79
May	14.435	11.856	14.618	12.226	61.73	54.03
June	13.942	12.110	14.212	12.360	57.30	53.93
July	13.0 4	11.771	13.341	11.923	56.64	52.89
August	12.962	11.404	13.159	11.649	58.44	51.96
September	.....	11.480	.....	11.760	.....	52.68
October	.....	11.449	.....	11.722	.....	52.18
November	.....	11.288	.....	11.553	.....	51.08
December	.....	11.430	.....	11.599	.....	50.95
Year	.....	11.626	.....	11.887	.....	52.46

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Month.	1903.		1902.		1901.	
	London, Pence.	N. Y. Cents.	London, Pence.	N. Y. Cents.	London, Pence.	N. Y. Cents.
January	21.98	45.57	25.62	55.56	28.97	62.82
February	22.11	47.89	25.41	55.09	28.13	61.06
March	22.49	48.72	25.00	54.23	27.04	60.23
April	23.38	50.56	24.34	52.72	27.30	59.29
May	24.89	54.11	23.71	51.31	27.43	59.64
June	24.29	52.86	24.17	52.36	27.42	59.57
July	24.86	53.92	24.38	52.88	26.96	58.46
August	25.63	55.38	24.23	52.52	26.94	58.37
September	....	....	23.88	51.52	26.95	58.26
October	....	....	23.40	50.57	26.62	57.59
November	....	....	22.70	49.07	26.12	56.64
December	....	....	22.21	48.03	25.46	55.10
Year	....	....	24.09	52.16	27.11	58.95

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Name of Company.	Date.	Per Share.	Total.	Total to Date.
Calumet & Hecla	Sept. 24	10.00	$1,000,000	$82,351,000
*Central Lead, Mo.	Sept. 15	.50	5,000	370,000
*Daly West, Utah	Sept. 15	.60	108,000	3,231,000
*Empire-State, Ida	Sept. 15	.05	25,277	1,789,155
*Four Oil, Cal.	Sept. 15	.01	2,087	43,827
*Imperial Oil, Cal.	Sept. 7	.20	20,000	440,000
†National Lead, pf.	Sept. 15	1.75	260,820	13,709,348
*N. Y. & Hon., Rosario	Sept. 15	.10	15,000	1,985,000
*Ohio & Indiana Gas	Sept. 1	1.00	90,000	1,350,000
Standard Oil	Sept. 15	5.00	4,850,000	195,075,000
Wolverine, Mich.	Oct. 1	3.00	180,000	1,230,000

ASSESSMENTS.

Name of Company.	Location.	No.	Delinq.	Sale.	Amt.
Annandale	Utah	..	Aug. 15	Sept. 12	.00½
Challenge Con.		..	Sept. 15	Oct. 6	.10
Chollar	Nev.	..	Sept. 17	Oct. 8	.10
Con. Cal. & Va.	Nev.	..	Aug. 28	Sept. 18	.25
Daylight	Utah	..	Aug. 28	Sept. 30	.01
Emerald	Utah	..	Aug. 15	Sept. 12	.00½
Hale & Norcross	Nev.	..	Aug. 31	Sept. 30	.10
Lucky Bill	Utah	..	Aug. 3	Sept. 7	.07½
Murray Hill	Utah	..	Sept. 5	Sept. 21	.03
New Redwing	Utah	..	Aug. 20	Sept. 10	.02
Ophir	Nev.	..	Sept. 15	Oct. 5	.15
Puget Sound Iron		..	Sept. 10	.....	.25
Savage	Nev.	..	Aug. 25	Sept. 15	.10
Shenandoah Con.	Cal.	..	Sept. 10	.....	.02
Skylark	Utah	..	Aug. 22	Sept. 8	.00½
Stockton	Utah	..	Aug. 31	Sept. 21	.01
Metallic Hill.	Utah	..	Aug. 24	Sept. 10	.01
New Montezuma	Cal.	..	Sept. 10	.....	.02
Potosi	Nev.	67	Sept. 14	Oct. 6	.10
Wabash	Utah	4	Sept. 9	Oct. 5	.05

*Monthly. †Quarterly.

STOCK QUOTATIONS

NEW YORK.

Company and Location.	Par val	Shares Listed.	Aug. 26 H.	Aug. 26 L.	Aug. 27 H.	Aug. 27 L.	Aug. 28 H.	Aug. 28 L.	Aug. 29 H.	Aug. 29 L.	Aug. 31 H.	Aug. 31 L.	Sept. 1 H.	Sept. 1 L.	Sales.
Alice, Mont.	25	400,000					20								50
Alta, Nev.	1														
Amalgamated c., Mont	100	1,538,879	49⅛	47¾	48⅜	47⅛	50⅝	78⅛	50⅛	49⅛	51⅛	48¼	50	48⅝	198,015
Anaconda c., Mont.	15	1,200,000	80	78	83½	80½	86¾	83	87	85	86½	85¾	83	80⅝	11,300
Anaconda Gold, Colo.	1	1,000,000	13½												500
Andes Nev.	1	100,000			.14										500
Best & Belcher, Nev.	3	100,000													
Breece, Colo.	25						22								100
Brunswick, Cal.	1		.04				.03½				.03⅛				1,430
Caledonia, Nev.	2½				1.00								1.00		400
Challar, Nev.	100	112,030							.12		.12				500
Con.Cal.&Va. g.s., Nev	2½	216,000			1.40				1.40		1.30				1,161
Cons. Imperial, Colo.	1	500,000	.05								.05				2,000
Creede & C. C., Colo.	1		.03				.03½		.03½		.04				4,509
Crown Point, Nev.	3														
Daly, Utah	20														
Dunkin, Col	1														
Elkton, g., Colo.	1	1,250,000			45		40				39		.40		1,200
Golden Fleece, Colo.	0	600,000													
Gould & Carry, Nev.	1				.41	.40									600
Greene Con., c., Mex.	15	720,000	19	28⅝	18⅝	18¼	18⅞	18⅜	19		19¼		19	18⅞	1,750
Hale & Norcross, Nev	3		47		47										800
Horn Silver, Utah	21	400,099									1.10				100
n ver Colo.	20								1.75						100
Isab lla, g., Colo.	1	2,500,000					12						14½	14	2,500
Leadville Colo.	20										.03				500
Little Chief, Colo.	1				.08								.05	.08	1,500
Mexican, Nev.	3	100,800			1.00	.95							1.05		500
Moon-Anchor, Colo.	5	600,000											.09		500
Occidental, Nev.	3	1,000,000	40				37		33						1,000
Ontario, Utah	100	150,000											5.25	4.50	300
Ophir, Nev.	1	100,800							1.50		1.50		1.55		800
Pharmacist, Colo.	1								.04	.03½	.04	.03½	.03½		5,500
Portland, Colo.	10	3,000,000					1.20		1.20		1.21		1.20		700
Potosi, Nev.	3	112,000	.17						.12		.13				500
Savage, Nev.	2½	112,000			.23										1,000
Small Hopes Colo.	20	250,000			.70										100
Silver Hill, Nev	1	180,000									.30				300
Standard, Cal.	10		2.25												500
Tenn., c., Tenn.	25	175,000													
Union Con., Nev.	2½	100,000	.72	.71											300
Union Cop., N. C.	10	300,000			1	1	1⅛				1⅛		1¼	1⅛	2,600
Uni'd Cop. com., Mont	100	450,000	15¼	15½	15¾		15⅞		15⅞		15⅞		15⅝		4,774
White Knob, g. s., Ind.	100	150,000											10¼		100
Yellow Jacket, Nev.	3	120,000													

Total sales 248,780 shares. † Ex-Dividend

COLORADO SPRINGS (By Telegraph).

Name of Company.	Aug. 31. H.	Aug. 31. L.	Sept. 1. H.	Sept. 1. L.
Acacia	.06	.03¼	.06½	.05⅜
Am. Con.	.02	.01½	.02½	.02
Anaconda	.11½	.10⅜	.12	.10⅜
Blue Bell	.05½	.04	.06½	.05½
Cripple Creek Con.	.04½	.04		
C. K. & N.	.18⅜	.17	.18⅜	.18
Doctor Jack Pot	.08⅜	.08⅛	.08⅛	.08
Elkton Con	.43	.41	.43	.41½
El Paso	.61	.60		
Findley	.13½	.13	.14¼	.13⅜
Gold Dollar Con.	.04½	.01¾	.04⅜	.04½
Golden Cycle	.67	.65¼	.67	.66
Golden Fleece	.15	.16	.12	.06
Gould			.04	.02
Isabella	.12	.11⅝		
Jack Pot	.16	.05	.10	.05½
Keystone	.03¾	.03½	.03¾	.03¼
Last Dollar	.50	.35		
Lexington	.03½	.03		
Little Puck	.03	.02		
Mollie Gibson	.05½	.04	.05⅞	.04
Moon Anchor	.10	.09		
Old Gold	.07¼	.07	.07¼	.06¾
Pharmacist	.03¼	.03½	.03½	.03
Pinnacle	.03¼	.02½	.03¼	.02½
Portland	1.24	1.20½	1.40	1.20
Vindicator	.90	.60		
Work	.05⅜	.05⅛	.05¼	.05

COLORADO SPRINGS, COLO.*

Name of Company.	Par Val	Shares Listed.	Aug. 22 H.	Aug. 22 L.	Aug. 24 H.	Aug. 24 L.	Aug. 25 H.	Aug. 25 L.	Aug. 26 H.	Aug. 26 L.	Aug. 27 H.	Aug. 27 L.	Aug. 28 H.	Aug. 28 L.	Sales
Acacia	$1	1,500,000	.05½	.05⅛	.05¾	.05⅛	.05¾	.05⅜	.05⅞	.05¼	.05⅛	.05⅜	.05⅜	.05⅛	
Am. Con.	1	2,000,000	.01½				.02½		.02½		.01⅝		.02½		
Anaconda	5	1,000,000	.11	.10¼	.10½		.11¼	.10½	.12	.10½	.11⅜	.10½	.10⅛		3,000
Ben Hur	1	900,000	.02	.01½	.02		.02		.01½		.02⅛		.02¼		2,000
Blue Bell	1	1,000,000	.05		.04½		.03		.03½		.03		.03⅛		
C. C. & M.	1	1,000,000	.02¼	.02⅛	.02¼	.02½	.02¼	.02⅜	.02¼	.02⅛	.02⅜	.02½	.02¼	.02⅛	
C. K. & N.	1	1,250,000	.18	.17	.18	.17⅜	.17⅜	.17	.17⅜	.17	.18	.17	.18¼	.17⅛	
C. C. Con.	1	2,000,000	.04⅜	.03⅝			.04⅛	.03⅝	.04	.03⅝	.03⅝		.04⅜	.03⅝	
Coriolanus	1	1,500,000	.02⅛		.02¼		.02¼		.02¼		.02		.02		
Des Moines	1	750,000	.02⅛		.02⅛		.02		.02		.02		.02		
Dr. Jack Pot	1		.09	.08	.08¾	.08¼	.08¾	.08¼	.08¾	.08	.09	.08	.03½	.08	1,000
Elkton Con.	1	1,250,000	.41	.39½	.42	.40	.42	.40¼	.42	.41	.42	.40½	.43	.41	
El Paso	1	900,000	.60	.55½	.59½	.56½	.60	.58	.59½	.58½	.60	.58½	.60	.59¾	3,500
Fannie Rawlings	1	1,000,000	.02½		.03	.02¼	.02¼		.02¾	.02½	.03¾	.02	.03	.02¼	
Findley	1	1,250,000	.13¾		.14	.13½	.14	.13½	.14	.13⅜	.14	.13½	.14	.13½	
Gold Bond	1	1,000,000	.02	.01½	.02	.01¾	.02	.01½	.01¾		.01⅜		.01½		
Gold Dollar Con.	1		.04¼	.03⅞	.04¼	.03⅞	.04½	.04	.04¾	.04½	.04¼	.04⅛	.04⅜	.04⅛	
Golden Cycle	1	2,000,000	.67	.64½	.67	.64	.67	.65½	.68	.64½	.67	.65½	.67	.65	
Golden Fleece	1	600,000	.12	.06	.15	.06	.12	.06	.12	.06	.12	.06	.12	.06	
Gould	1	1,250,000	.02	.01½	.02		.02	.01⅝	.02½	.01¾	.02	.01¾	.02	.01⅞	5,000
Hart	1	1,000,000	.02		.02		.02		.02		.02		.02		
Isabella	1	2,500,000	.10⅝	.10½	.10⅝	.10¼	.11	.10	.10⅞	.10½	.11¼	.10¾	.12	.11	1,500
Jack Pot	1	1,250,000	.05¼		.05		.05				.05		.05		
Last Dollar	1	1,500,000	.50		.50		.50		.50		.50		.60		
Lexington	1	1,500,000	.03½	.03¼	.03⅝	.03⅜	.03⅝	.03¼	.03⅜	.03¼	.03⅝	.03¼	.03⅝	.03¼	3,000
Little Puck	1	2,000,000			.03	.02	.03	.02	.03	.02¼	.03	.02¼	.02¾	.02¼	
Mollie Gibson	5	1,000,000	.05½		.05½		.05½	.04	.05½		.05⅝		.05⅝		
Moon-Anchor	1	600,000	.09½	.08¾			.09½	.08¾	.09½	.08¾	.09½	.08¾	.09½	.08¾	2,000
New Haven	1	1,500,000	.02⅜	.02½	.02½	.02¼	.02½	.02⅜	.02½	.02¼	.02½	.02¼	.02½	.02⅜	1,000
Pharmacist, Con	1	1,500,000	.03½	.03¼	.03½	.03	.03½	.01	.03⅝	.03¼	.03⅝	.03¼	.04	.03¼	
Pinnacle	1	2,000,000	.03¼		.03⅜		.03¼		.03¼		.03¼		.03¼		
Pointer	1	1,250,000	.009		.019		.009		.009		.009		.004		1,000
Portland	1	3,000,000	1.30	1.20	1.24	1.20	1.23	1.20‡	1.25	1.20	1.25	1.21	1.23	1.21	
Prince Albert	1	3,000,000	.02¼	.01½	.02½	.01¾	.02¼	.01¾	.02¼	.01½	.02¼	.01¾	.02	.01⅝	
Vindicator	1	1,500,000	.85		.90		.90		.90		.90		.90		
Work	1	1,500,000	.05½	.05	.06¾	.05	.07¼	.05½	.05⅞	.05½	.06¾	.05	.06¾	.05¼	

*Colo. Springs Mining Stock Exchange. All mines are in Colorado. Total sales 25,000 shares.

SAN FRANCISCO (By Telegraph).

Name of Company.	Shares Issued.	Aug.-Sept. 31.	Aug.-Sept. 1.
Belcher	104,000	.25	.25
Best & Belcher	100,800	1.50	1.50
Caledonia	100,000	.89	.85
Challenge Con.	50,000	.24	.23
Chollar	112,000	.12	.12
Confidence	24,980	.95	.85
Con. Cal. & Va.	216,000	1.45	1.50
Con. Imperial	500,000	.03	.03
Crown Point	100,000	.13	.12
Gould & Curry	108,000	.27	.28
Hale & Norcross	112,000	.52	.53
Justice	105,000	.10	.10
Mexican	100,800	1.05	1.05
Occidental Con.	100,000	.36	.36
Ophir	100,800	1.60	1.70
Overman	115,200	.26	.24
Potosi	112,000	.13	.12
Savage	112,000	.22	.22
Sierra Nevada	100,000	.65	.67
Union Con.	100,000	.65	.67
Utah Con.	100,000	.20	.21
Yellow Jacket	120,000	.53	.53

COAL, IRON AND INDUSTRIAL STOCKS.*

Name of Company.	Par val.	Shares Issued.	Aug. 26 H.	Aug. 26 L.	Aug. 27 H.	Aug. 27 L.	Aug. 28 H.	Aug. 28 L.	Aug. 29 H.	Aug. 29 L.	Aug. 21 H.	Aug. 21 L.	Sept. 1 H.	Sept. 1 L.	Sales
Allis-Chalmers, U. S.	$100														
Allis-Cham's, pf, U. S.	100	200,000													
Am. Agr. Chem., U. S.	100										15		15¼	15	700
Am.Agr.Chem.pf,U.S.	100	181,350													
Am. Sm. & Ref., U. S.	100	500,000	45½	45	44½								45½	45¼	928
Am.Sm. & Ref.,pf,U.S.	100	500,000	90				90⅝	90					90¾	90⅜	1,522
Am. Steel & Fdy.,U.S.	100														
Am. S. & Fdy., U. S.	100	155,000													
Col. Fuel & I., Colo.			53	51	53	52	54¾	52½	54½	53⅜	54	52¾			7,280
Col. & H. C. & I., Colo.	100	69,244							15¼						100
†Crucible Steel, U. S.	100	250,000	9¾	9⅜	9¾	9¼	9⅞	9½	10	9⅞	10⅜	9⅞	10⅞	10½	4,006
†CrucibleSteel,pf,U.S.	100	250,000	71¼	70½	71¼	70¼	70½	70	70⅝	70⅝	71	70¾	71⅜	70¾	1,208
†Mong. R. Coal, Pa.	50	200,000	10¾		10½	10⅜							10½		370
†Mong. R. Coal, pf, Pa.	50	98,300	37½		37¾	37½	37½						37½		372
National Lead, U. S.	100	149,054					15½						15½		309
National Lead, pf,U.S.	100	149,040			86								85		300
†Phila. Nat. Gas.	100	308,542	39¾		39½		39¾								235
†Phila. Nat. Gas, pf.	100	212,873													
†Pittsburg Coal, Pa.	100	300,307	32¾	32	32½	32¼	32½		32½	32⅜	34½	32¼	34½	34	7,432
†Pittsburg Coal,pf,Pa.	100	297,012	83½	63	82½	82⅜	83½	82½	84		85½	84	85¼	84¼	978
Republic I. & S., U. S.	100	273,520			11½	11⅜	11½		11¾		11¾	11⅛	11⅜		1,720
Republic I.&S.,pf,U.S.	100	203,569			68¼	64¾	66¼	64¼	96	65¼	57	66	67		6,500
Sloss-Shef S. & I., Ala.	100	75,000									35	34½			300
Sloss-ShefS.&I.pf,Ala.	100	65,085											80		100
Standard Oil, U. S.	100	970,000			612	610	625	615	515	607					121
Tenn. C.I. & R.R.	100	225,000	41½		42	41½	43	42	43¼	42¾	44	43½	43	42	5,300
U.S. Red. & Ref., U. S.	100	59,188													
U.S.Red&Ref.,pf, U.S.	100	39,485													
U.S. Steel Corp., U. S.	100	5,084,952	23	22⅜	22¾	22¼	22⅞	22⅜	23	22⅝	23⅜	22⅞	24⅛	22¾	46,117
U.S. SteelCrop.pf,U.S.	100	5,103,141	70⅜	70¾	70½	69¾	71	69¾	71	70¾	71½	71	71⅜	70⅝	23,879
Va.-Car Chem., U. S.	100	279,844	22½	22¼			23½	23			24	23			1,200
Va.-Car Chem.,pf,U.S.	100	120,000											94½		100
Va. L., Coal & Coke	100	86,416											23		200

*New York Stock Exchange. †Pittsburg Stock Exchange. ‡Ex-dividend. Total sales 111,388 shares.

BOSTON, MASS.*

Name of Company.	Par val	Shares listed	Aug. 26 H.	Aug. 26 L.	Aug. 27 H.	Aug. 27 L.	Aug. 28 H.	Aug. 28 L.	Aug. 29 H.	Aug. 29 L.	Aug. 30 H.	Aug. 30 L.	Sept. 1 H.	Sept. 1 L.	Sales.
Adventure Con., c.	$25	100,000			6				6½	6¼	6	5	6	5½	240
Allouez	25	99,511	5¾	5½	6		6	5½			5⅝	5½			193
Amalgamated, c.	100	1,538,879	49	47½	48⅜	47⅝	50⅜	40⅜	50½	40⅜	51½	49	50	48¾	34,522
Am. Gold Dredging	5	90,000													
Am. Z. L. & Sm.	25	60,000			8				8½						115
Anaconda	25	1,200,000			20⅜		21		21						55
Arcadian, c.	25	150,000					1¾		1¾		1¾				125
Arnold	25	60,000													
Atlantic, c.	25	100,000	9½	9			8¾								300
Bingham Con., g. s.	50	150,000	26⅜	25¾	26⅝	26	26⅜	25¾	26		26⅛	26	26⅜	26	1,865
Bonanza	10	300,000	.55												50
British Columbia	5	258,500											.03½		50
Cal. & Helca, c.	25	100,000	450		484	450	484½	483					465		150
Centennial, c.	25	90,000	22	20½	21½	20	21½	21	21½	20½	21½	20⅝	20⅝	20½	9,826
Cochiti	10				25										100
Con. Mercur, g.	5	1,000,000					1⅛		1⅛	1⅛	1⅛		1⅛	1⅛	555
Copper Range Con.	100	285,000	67⅞	64¼	63¾	63⅛	67	65½	67½	65½	67	65½	66⅜	65	79,586
†Daly-West	20	180,000	40½	40¼	40¼	40	40		40¾	40	41	40	41	40	1,180
Dominion Coal	100	150,000	80	79½	79½	79			81	80	83½	82¼	84¼	82¼	1,115
Dominion Coal, pf.	100	30,000	109												10
Dominion I. & S.	100	100,000													
Elm River	12	100,000	3	2¾			2¾						2⅛	2⅞	500
Franklin, c.	25	100,000			8¾										25
Granby Con.	10	1,336,303	4½				4								1,075
Guanajuato Con.	5	385,000			1		1				1				200
Isle Royal Con., c.	25	385,000			7		7½	7⅜	7		7¾	7½			415
Mass Con., C.	25	100,000	5½	5			5½								100
Mayflower, c.	25	100,000													
Michigan, c.	25	100,000	8¼		8		8½		8¾		9		8½	8¼	430
Mohawk, c.	25	100,000	44¼	43			44	43¾	43¾	43¼	43⅜		43¾	43½	1,185
Mont. Coal & Coke	25	200,000													
Mont'l & Boston, c.	5	570,000									.95				100
New Idria	5	100,000													
Nova Scotia St. & C.	100	37,623													
Nova Scotia St.&C., pf.	100	16,300													
Old Colony, c.	25	100,000					1		1				1		245
Old Dominion, c.	25	150,000	10		10¼		10½	10	10⅛				10¼	10	840
Osceola, c.	25	96,150	62	61¼	61½	60¼	62	61	61		61	60	60¼	60	723
Parrott, s. c.	10	229,850	21				22		22	21	25	21	21		534
Phœnix Con, c.	25	100,000					5½	5¼			5½				125
Quincy, c.	25	100,000											95	90	105
Rhode Island, c.	25	100,000													
Santa Fe, g. c.	10	250,000													
Shannon, c.	10	188,153	11¾	11¼	11⅜	11	11	10¾	10⅞	10⅜	10½	10	10⅜	10	5,980
Tamarack, c.	25	60,000			115	105			100						47
Tecumseh	25	80,000													
Tennessee	25	160,000													
Trimountain	100	450,000	72	81½	81	80½	81	80½	80¾	80	78	76	73½		973
Trinity, c.	25	419,000	7¾	6¾	7⅛	7	8	7½	8		7¾	7¼	7½		10,773
United c.	25	240,000													
United States, g.	10	300,000	20¼	20	20	19⅞	20⅛	20	10⅜	20	20⅛	20¼	20¼	20	1,825
U. S. Coal & Oil.	25	100,000	11⅜	11¼	11⅜						11¼	11	11	10¾	805
Utah Con., g.	25	100,000	28	27½	27⅛	27⅛	28	27¾	27¾	27⅛	28½	27¾	28	27¾	2,422
Victoria	25	60,000	4	3¾							4				100
Winona, c.	25	100,000	9⅛	9	9		9	8¾	9		9¼	9			485
Wolverine, c.	25	60,000	74	73	73				73		73¾		74	73½	323
Wyandot	25	100,000			1¼	.75									108

*Boston Stock Exchange. †Ex Dividend. ‡Assessment Paid. Total sales, 190,092 shares.

SAN FRANCISCO.*

Name of Company.	Location.	Capitalization.	Aug. 21 H.	Aug. 21 L.	Aug. 22. H.	Aug. 22. L.	Aug. 24. H.	Aug. 24. L.	Aug. 25 H.	Aug. 25 L.	Aug. 26 H.	Aug. 26 L.	Aug. 27 H.	Aug. 27 L.	Sales
Central Eureka	Cal.	$400,000									84				1,000
Colehan	Nev.	1,000,000													
Esperanza	Nev.	1,000,000	.05	.04	.05		.05	.04	.03		.03		.05		34,200
Gipsy Queen	Nev.	750,000			.27	.26	.27	.26	.26				.26	.04	900
Hannapah	Nev.	1,000,000	.25		.25										1,500
MacNamara	Nev.	500,000			.20						.20		.20	.19	1,200
Mont-Tonopah	Nev.	1,000,000	1.10				1.10	1.07½			1.07½		1.07½	1.02½	2,415
New York Tonopah	Nev.	1,000,000													
Paymaster	Nev.	750,000	.17	.14											400
Pine Grove G. M. Co.	Nev.	1,000,000							.54						100
Rescue	Nev.	500,000	.11	.10			.09		.11	.10	.10		.10		4,600
Tonopah-Belmont	Nev.	2,000,000									1.80		1.80		150
Tonopah & Cal.	Nev.	2,000,000	.35		.35				.33						700
Tonopah Fraction	Nev.	750,000													
Tonopah Midway	Nev.	1,000,000													
Tonopah Mg. Co.	Nev.														
Tonopah North Star	Nev.	750,000	.47				.47	.45							1,100
Tonopah & Salt Lake															
Tonopah Union	Nev.	750,000													
United Tonopah	Nev.	1,000,000											.16		4,000

*San Francisco & Tonopah Mining Exchange. Total sales 52,265 shares.

STOCK QUOTATIONS

MEXICO*. Aug. 21

Name of Company.	Shares Issued.	Last div'd	Prices. Bid.	Prices. Ask.
Durango:				
Ca. Min. de Penoles	2,500	$50.00	$3,800	$4,100
San Andres de la Sierra	200	.....	10,000	.....
Guanajuato:				
Angustias, Pozos	2,400	5.00	115	120
Cinco Senores y An., aviadoras	2,000	15.00	195	200
Cinco Senores y An., aviada	400	10.00	180	190
Providencia, San Juan de la Luz	6,000	2.00	135	140
Queensland y Australia	300	.....	75	90
Guerrero:				
Delfina, 1st serie	2,500	.....	40	45
Delfina, 2nd serie	2,500	.....	32	35
Garduno y Anexas	7,200	.....	45	60
Hidalgo:				
Amistad y Condordia	9,600	8.87	89½	90
Carmen, aviada	1,100	.....	150	160
Guadalupe Fresnillo Mill	1,000	.....	180	250
Guadalupe Fresnillo Mine	1,400	.....	70	80
La Blanca, aviadora	1,536	.....	.....	.....
La Blanca, aviada	768	.....	.....	.....
La Reina y An., aviadora	5,600	.....	22	24
Luz de Maravillas, aviadas	1,100	.....	.....	20
Maravillas y An., aviador	1,680	.....	150	200
Maravillas el Lobo	1,000	.....	130	180
Palma y An., aviador	1,800	.....	.....	12
Real del Monte	2,554	10.00	.....	.....
Refugio, aviada	12,800	.....	6	8
Santa Anay An., aviadora	1,800	.....	30	40
Santa Anay An., aviada	600	.....	25	30
Sta. Gertrudis y An., aviadas	9,600	.....	11½	13
Sta. Gertrudis y An., aviadora	28,800	1.00	90	91
Santo Tomas Apostol aviadoras	5,100	.....	2	3
San Felipe de Jesus, aviadora	3,600	.....	23	24
San Felipe de Jesus, aviada	1,200	.....	10	15
San Rafael y An., Trompillo	1,200	12.00	1,440	1,450
San Rafael y An., aviada	1,200	4.00	580	585
Soledad, aviada	960	5.00	460	480
Sorpresa, aviada	960	5.00	325	345
.....	.....	.....	.....	.....
Mexico:				
Alacran	2,400	.....	.....	60
Aldebarren	.....	.....	165	175
Buen Despacho	2,000	.....	115	120
Dos Estrellas	3,000	30.00	3,500	3,600
La Esperanza (El Oro.)	3,000	10.00	.....	1,500
La Reformia, aviadores	2,000	.....	90	93
Providencia, pagadoras	1,600	.....	.....	.....
Providencia, liberadas	900	.....	.....	.....
Santa Ana, Esperanza	2,400	.....	70	90
Michoacan:				
Luz de Borda, aviadora	3,000	.....	165	175
Luz de Borda, aviado	1,000	.....	55	70
Nuevo Leon:				
La Fraternal	1,000	.....	550	600
Norias de Bajan	1,000	.....	800	850
Santiago y An., Tlal.	4,000	.....	.....	.....
San Luis Potosi:				
Concepcion y An.	3,000	.....	85	95
El Barreno, aviadora	2,000	2.00	35	36
Sta. Maria de la Paz	2,400	20.00	730	740
San Diegoy Annexas	2,400	4.00	18	22
Zacatecas:				
Asturiana y An.	2,500	.....	75	85
Candelaria y Pinos	2,500	10.00	200	220
Cubiertas	2,400	.....	.....	.....
Esperanza y An.	2,400	.....	30	40
Lourdes	2,500	.....	25	40
Luz de Minillas, pagadoras	2,000	.....	10	15
Nueva Quebradilla, aviadoras	2,400	.....	90	95
Nueva Quebradilla, aviadas	600	.....	25	30
San Carlos y Annexas	2,500	20.00	155	165
Sta. Maria de Gaud	2,500	10.00	75	85
Miscellaneous:				
Bartolome de Medina	2,000	1.50	70	73
Guadalupe Hacienda	20,000	6.00	.....	.....
La Luz Hac. (Pachuca.)	3,750	.....	.....	.....
La Reina (Chihuahua.)	192	.....	.....	.....
Naica (Chihuahua.)	100	.....	11,000	13,000
Natividad (Oaxaca) aviadora	1,800	10.00	1,000	1,080
Natividad (Oaxaca) aviadas	600	4.00	.....	.....
San Francisco Hac.	6,000	1.00	53	57
Santa Ana Huantla Morelos	4,000	.....	.....	.....
Union Hacienda	3,000	5.00	225	240

*Values are in Mexican currency.

TORONTO, ONT.* Aug. 29

Name of Company.	Par val	Prices. High.	Prices. Low.	Sales.
Black Tail	$1	.04	.02	.....
Cariboo (Mc. K.)	1	.13	.12	.....
Cariboo (Hyd.)	1	.75	.....	.....
Center Star	1	.28	.22	.....
Crows Nest, C.	100	3.50	2.75	.....
Dominion Coal, com.	100	.81	.79	.....
Dominion S. & I.	100	10.50	8.00	.....
Fairview	1	.05	.03	.....
Giant	1	.04	.02	.....
Deer Trail	1	.02½	.01¼	.....
Iron Mask	1	.06	.....	.....
Morrison	1	.04	.02	.....
Granby Smelter	$10	4.50	3.75	.....
Mountain Lion	1	.28	.20	.....
North Star	1	.14	.10	.....
Nova Scotia Steel, com	100	83.00	82.50	.....
Payne	1	.19	.16	.....
Rambler Cariboo	1	.38	.30	.....
Republic	1	.03	.01	.....
St. Eugene	1	.48	.40	.....
Virtue	1	.07	.05	.....
War Eagle Con.	1	.15	.10	.....
Sullivau	1	.06	.04	.....
Wiuuipeg	1	.04	.....	.....
Wonderful	1	.04	.....	.....

*Standard Stock and Mining Exchange. Total sales, 25 shares.

SALT LAKE CITY.* Aug. 22.

Name of Company	Par Val	Shares.	High	Low	Sales.
Ajax	$10	300,000	.17½	.17	500
Carisa	1	300,000	.14	.08	60,300
California	1	500,000	.14	.12	6,700
Century	.....	.....	.39	.39	100
Con. Mercur	5	1,000,000	1.52	1.48½	1,200
Daly-Judge	20	300,000	9.25	9.05	850
Daly-West	1	150,000	41.00	39.75	1,047
E. & B. Pencil	.....	.....	1.00	.90	400
Little Chief	.....	.....	.01¼	.01¼	1,500
L. Mammoth	20	250,000	.71	.69½	1,200
M. Washington	⅛	300,000	.02½	.02¼	500
May Day	¼	400,000	.11¼	.10½	15,000
Naildriver	.....	.....	1.27½	1.25	350
N. Y. Bonanza	....	.....	.26	.25	5,700
Ontario	....	.....	5.25	5.25	25
Petro	1	.....	.11	.11	2,500
Sacramento	5	1,000,000	.25½	.24½	3,100
Star Con	.....	.....	.17½	.14½	15,400
Silver Shield	.....	.....	.08¾	.08½	10,000
Swansea	.....	.....	.15	.15	500
Tetro	1	500,000	.04	.03½	2,000
Uncle Sam Con	1	500,000	.22½	.21	3,600
Uuited States	....	.....	20.00	20.00	50
Victor Con	1	500,000	.14½	.13½	5,600
Wabash	.....	.....	.16¾	.14½	6,200
Yankee Con	1	500,000	.31½	.29	1,600

*By our Special Correspondent. All mines are in Utah. Total sales, 146,922 shares.

PHILADELPHIA, PA.*

Name and Location of Co.	Par val.	Aug. 26. H.	Aug. 26. L.	Aug. 27 H.	Aug. 27 L.	Aug. 28. H.	Aug. 28. L.	Aug. 29. H	Aug. 29. L.	Aug. 31. H.	Aug. 31. L.	Sept. 1. H.	Sept. 1. L.	Sales
Am. Alkali, Mich	$50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Am. Cement	10	.....	.....	7½	.....	7¼	.....	7½	.....	.....	.....	7½	.....	164
Cambria Iron, Pa	50	47	.....	.....	.....	47	.....	.....	.....	.....	.....	47	.....	131
Cambria S., Pa	50	22	.....	22	.....	.....	.....	22	.....	22½	22	.....	.....	970
Penn. Steel, pfd	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	85	82	51
Susq. I. & S., Pa	5	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	77
United Gas I. Pa	50	81½	.....	84¼	84	.....	.....	84	.....	85¾	84	86	85	1,403
Warwick I. & S.	10	.....	.....	.....	.....	4¼	.....	.....	.....	.....	.....	.....	.....	100
Diamond Steel	50	1⅛	.....	1⅛	.....	⅛	.....	1	.....	.....	.....	.....	.....	886
Lehigh Navig'n	50	68	67½	.....	.....	.....	.....	.....	.....	.....	.....	68	.....	193
Philadelphia	50	39⅞	.....	40	.....	40	.....	40	.....	40⅛	40	40⅞	40⅛	840
U. S. Steel	100	23⅞	22⅛	22½	22¾	23¾	23⅜	23¼	.....	23	21¼	23	23¼	3,688
U. S. Steel, pf.	100	71	.....	70	.....	.....	.....	.....	.....	.....	.....	.....	.....	2

*Reported by Townsend, Whelen & Co., 309 Walnut St., Philadelphia, Pa. Total sales 8,526 shares.

LONDON. Aug. 21

Name and Country of Company.	Shares Issued.	Par value. £. s. d.	Latest dividend. Amt. s. d.	Latest dividend. Date.	Quotations. Buyers. £. s. d.	Quotations. Sellers. £. s. d.
Alaska-Treadwell, g., Alaska	200,000	5 0 0	3 0	Apr., 1903	4 7 6	4 12 6
Anaconda, c. s., Montana	1,200,000	5 0 0	2 0	May, 1903	3 17 6	4 0 0
Arizona, c., Def., ord.	63,444	1 0 0	5 6	Aug., 1903	7 0 0	7 10 0
Arizona, pref., ord.	316,350	1 0 0	5 6	Aug., 1903	7 2 6	7 7 6
Camp Bird, g., Colorado	738,000	1 0 0	.. 9	Sept. 1903	1 6 3	1 8 9
Central Chile, C., Chile	276,248	1 0 0	6	Jan. 1902	3 0 0	4 0 0
Copiapo, c., Chile	112,500	2 0 0	6 10	May, 1903	1 7 6	1 12 6
De Lamar, g. s., Idaho	80,000	1 0 0	2 0	Nov., 1902	10 0	12 6
El Oro, g., Mexico	1,000,000	1 0 0	1 6	July. 1903	1 11 3	1 13 9
Frontino & Bolivia, g., Columbia	128,682	1 0 0	3 0	July, 1901	15 0	17 6
Le Roi, g., British Col.	200,000	5 0 0	5 0	Nov., 1899	16 3	18 9
Le Roi No. 2, g., British Col.	120,000	5 0 0	5 0	May, 1902	1 1 3	1 3 9
Mesquital, Mexico	250,000	2 0	3	Feb., 1903	2 6	3 6
Montana, g. s., Montana	657,128	1 0 0	6	April 1899	1 9	2 3
Mountain, c., Cal.	250,000	5 0 0	2 4½	May. 1903	2 17 6	3 2 6
Stratton's Independence, Colorado	1,000,007	1 0 0	1 0	Aug., 1903	7 6	8 6
St. John del Rey., g., Brazil	546,265	1 0 0	8	June, 1903	15 6	16 6
Utah Con., g . c. (Highland Boy), Utah	300,000	1 0 0	6 3	July, 1903	5 0 0	5 10 0
Ymir, g., British Col.	200,000	1 0 0	1 0	Mar., 1902	5 0	7 6
European:						
Linares, l., Spain	15,000	3 0 0	1 0	Mar., 1903	2 0 0	2 10 0
Mason & Barry, c., sul., Port'g'l.	185,172	1 0 0	11 0	May, 1903	3 7 6	3 12 6
Rio Tinto, c., Spain	325,000	5 0 0	27 6	May, 1903	48 5 0	48 10 0
Rio Tinto, pref., Spain	325,000	5 0 0	2 6	May, 1903	6 2 6	6 7 6
Tharsis, c., Spain	625,000	2 0 0	6 0	May, 1903	4 0 0	4 5 0
Australia and New Zealand:						
Assoc. Gold Mines, W. Australia	495,388	1 0 0	2 0	July, 1903	1 17 6	1 18 9
Briseis, Tin, Tasmania	600,000	1 0 0	.....	.....	4 6	5 6
Broken Hill Pr'p, s., N. S. Wales	960,000	8 0	1 0	Aug., 1903	1 10 0	1 11 0
Cosmopolitan Prop., W. Australia	385,000	1 0 0	1 0	May, 1903	15 6	16 6
Golden Horse Shoe, W. Australia	300,000	5 0 0	6 0	Apr., 1903	7 8 9	7 11 3
Great Fingall Con., W. Australia	250,000	1 0 0	5 0	Apr., 1903	7 10 0	7 12 6
Great Bo'd'r Pr'p, W. Australia	1,750,000	2 0	6	June, 1903	1 6 6	1 6 9
Ivanhoe Gold Corp., W. Australia	200,000	5 0 0	4 0	Apr., 1903	7 18 9	8 1 3
Kalgurli, g., W. Australia	120,000	1 0 0	2 6	July, 1903	4 0 0	4 2 6
Lake View Cons., g., W. Australia	250,000	1 0 0	rts.	Aug., 1902	2 3 9	2 6 3
Mt. Lyell M. & R. I., c., Tasmania	275,000	3 0 0	4 3	Sept., 1903	3 0 0	3 2 6
Mt. Morgan, g., Queensland	1,000,000	1 0 0	3	Aug., 1903	2 17 6	3 0 0
Waihi, g., New Zealand	497,412	1 0 0	2 6	June, 1903	5 3 9	5 6 3
Indian:						
Champion Reef, g., Colar Fields	473,000	10 0	5 6	Aug., 1903	7 12 6	7 15 0
Mysore Gold, Colar Fields	568,043	10 0	4 0	July, 1903	6 16 3	6 18 9
Nundydroog, g., Colar Fields	484,000	10 0	1 6	Mar., 1903	2 8 9	2 11 3
Ooregum, g., Maria de Gaud	343,000	10 0	1 9	Aug., 1903	1 10 0	1 12 6
Ooregum, g., pref., g., Colar Fields	240,000	10 0	1 9	Aug., 1903	1 18 9	2 1 3
African:						
Angelo, g., Transvaal	800,000	1 0 0	6 0	Aug., 1903	7 2 6	7 5 0
Bonanza, g., Transvaal	200,000	1 0 0	10 0	Aug., 1903	3 7 6	3 10 0
British South Africa	4,436,019	1 0 0	rts.	May, 1889	2 11 3	2 16 3
Cape Copper, S. Africa	300,000	2 0 0	1 0	July, 1903	2 11 3	2 13 9
Cape Copper, pref., S. Africa	75,000	2 0 0	1 0	July, 1903	2 10 0	2 15 0
City and Sub'n (New), g., Transvaal	340,000	4 0 0	4 0	Aug., 1903	6 12 6	6 17 6
Crown Reef, g., Transvaal	120,000	1 0 0	4 0	Aug., 1903	17 10 0	18 0 0
De Beers Con., d., pref., Cape Colony	800,000	2 10 0	10 0	Aug., 1903	19 0 0	19 2 6
De Beers Con., def.	1,000,000	2 10 0	15 0	Aug., 1903	19 11 3	19 13 9
East Rand, Prop., Transvaal	970,000	1 0 0	5 0	Aug., 1903	7 6 3	7 8 9
Ferreira, g., Transvaal	90,000	1 0 0	15 0	Aug., 1903	20 5 0	20 15 0
Geldenhuis Est., g., Transvaal	200,000	1 0 0	6 0	Aug., 1903	6 3 9	6 6 3
Geduld, g., Transvaal	400,000	1 0 0	rts.	Mar., 1902	6 8 9	6 11 3
Henry Nourse, g., Transvaal	125,000	1 0 0	10 0	Aug., 1903	8 5 0	8 10 0
Jagersfontein, d., Orange, F. S.	200,000	5 0 0	6 0	Nov., 1889	28 17 6	29 2 6
Jubilee, g., Transvaal	50,030	1 0 0	5 0	July, 1903	5 5 0	5 10 0
Jumpers, Transvaal	100,000	1 0 0	5 0	Aug., 1899	3 12 6	3 17 6
Langlaagte Est., g., Transvaal	470,000	1 0 0	3 0	Aug., 1903	3 16 3	3 18 9
May Con., g., Transvaal	288,750	1 0 0	3 0	Aug., 1903	4 0 0	4 2 6
Meyer & Charlton, g., Transvaal	100,000	1 0 0	3 0	Aug., 1903	5 2 6	5 7 6
Modderfontein, g., Transvaal	290,000	1 0 0	rts.	Apr., 1902	9 13 9	9 16 3
Namaqua, c., Cape Colony	94,331	2 0 0	2 0	June, 1903	3 2 6	3 7 6
Primrose (New), g., Transvaal	325,000	1 0 0	2 0	Aug., 1903	3 17 6	4 0 0
Rand Mines, g., S. Africa	1,795,956	5 0	4 0	Aug., 1902	10 0 0	10 2 6
Robinson, g., Transvaal	750,000	5 0 0	5 6	Aug., 1903	10 0 0	10 5 0
Robinson Deep, g., Transvaal	950,000	1 0 0	2 0	Aug., 1903	4 12 6	4 17 6
Rose Deep, Transvaal	425,000	1 0 0	2 0	Aug., 1903	8 2 6	8 7 6
Salisbury, g., Transvaal	100,000	1 0 0	2 0	Mar., 1899	2 5 0	2 10 0
Sheba, g., Transvaal	1,075,000	1 0 0	6	July, 1599	17 6	18 9
Village Main Reef, Transvaal	400,000	1 0 0	4 0	June, 1903	7 15 0	8 0 0
Wemmer, Transvaal	80,000	1 0 0	10 0	July, 1903	11 2 6	11 7 6

c.—Copper. d.—Diamonds. g.—Gold. l.—Lead. s.—Silver. Ex-Dividend.

LONDON (By Cable.)*

Name of Company.	August 25. £. s. d.	Sept. 1. £. s. d.	Name of Company.	August 18. £. s. d.	Sept. 1. £. s. d.
Anaconda	4 2 6	4 7 6	Jagersfontein	28 17 6	29 0 0
British South Africa	2 12 6	2 13 9	Johannesburg Invest.	3 1 3	3 2 6
Camp Bird	1 7 0	1 7 9	Modderfontein	9 17 6	.....
Con. Gold Fields	6 11 3	6 11 3	Rand Mines	10 2 6	10 1 3
De Beers Con. def.	19 17 6	20 13 9	Rio Tinto, com	49 2 6	49 0 0
East Rand	7 7 6	7 8 9	Simmer & Jack	1 8 9	1 8 9
El Oro, Mex.	1 8 9	1 10 0	Tomboy	1 11 3	1 12 6

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. Aug. 13

Name of Company.	Country.	Product.	Capital Stock. Francs.	Par value. Fr.	Latest divs. Fr.	Prices. Opening. Fr.	Prices. Closing. Fr.
Almeda	California	Oil	1,000,000	1	9.50	9.50	9.00
Auzin	France	Coal	.....	.....	290.00	5,800.00	5,800.00
Boleo	Lower Cal.	Copper	.....	500	176.00	1,415.00	1,390.00
Canadian Am.	Can.	Coal	.....	20	.....	29.75	31.00
Champ d'Or.	S. Africa.	Gold	3,375,000	25	3.75	18.75	18.00
Courrieres	France	Coal	600,000	300	110.00	2,938.00	2,920.00
Fraser River	Brit. Col'mb.	Gold	250,000	25	.....	5.50	5.50
Huanchaca	Bolivia	Silver	40,000,000	125	5.00	83.00	83.00
Laurium	Greece	Zinc, Lead	16,300,000	500	25.00	342.00	341.00
Malfidano	Italy	Zinc	12,500,000	500	50.00	563.50	567.00
Metaux, Cie. Fran. de	France	Metal dealers.	25,000,000	500	22.50	480.00	488.00
Mokta-el-Hadid	Algeria	Iron	18,312,000	500	40.00	825.00	801.00
Nickel	N. Caled'nia.	Nickel	15,000,000	250	22.50	455.00	455.00
Sedalia & California	Calif., U. S.	Oil	1,000,000	1	.....	7.75	6.25
Vielle Montagne	Belgium	Zinc	9,000,000	30	30.00	670.00	674.00
Wyoming	California	Oil	.....	25	.....	280.00	282.00

ST. LOUIS, MO. Aug. 20

Name.	Par Val.	Shares.	Prices. Bid.	Prices. Ask.	Name.	Par Val.	Shares.	Prices. Bid.	Prices. Ask.
Am.-Nettie, Colo.	$10	300,000	$0.50	$0.55	Columbia Lead, Mo.	$10	50,000	$10.00	11.00
Catherine Lead, Mo.	10	50,000	1.25	2.25	Con. Coal, Ill.	100	50,000	22.00	22.75
Central Coal & C.	100	51,250	63.25	64.00	Doe Run Lead Co.	100	15,000	110.00	125.00
Central C. & C., pf.	100	18,750	73.00	74.00	Granite Bimet. Mt.	10	100,000	.37	.60
Central Lead, Mo.	10	100,000	115.00	125.00	St. Joe Lead, Mo.	10	600,000	16.00	17.00

*By our Special Correspondent.

DIVIDENDS.

GOLD, SILVER, COPPER, LEAD, QUICKSILVER AND ZINC COMPANIES.—UNITED STATES.

Name and Location of Company.		Authorized Capital Stock.	Shares. Issued.	Par Val	Dividends Paid 1903	Total to Date	Latest. Date.	Amt.
Acacia, g.	Colo.	$1,500,000	1,433,000	$1	$14,300	$57,560	Apr. 1903	.01
Adams, s. l. c.	Colo.	1,500,000	150,000	10		738,506	Oct. 1902	.05
Aetna Con., q.	Cal.	500,000	100,000	5		325,000	Apr. 1900	.15
Alaska-Maxican, g.	Alaska.	1,000,000	180,000	5	54,000	519,381	July 1903	.10
Alaska-Treadwell, g.	Alaska.	5,000,000	200,000	25	305,000	5,125,000	July 1903	.37½
Amalgamated, c.	Mont.	155,000,000	1,530,879	100	2,308,290	21,991,970	Aug. 1903	.50
Am. Sm. & Ref., pf.	U. S.	50,000,000	500,000	100	2,625,000	11,516,553	July 1903	1.75
Anaconda, c	Mont.	30,000,00	1,200,000	25	600,000	22,656,000	May 1903	.50
Annie Laurie, g.	Utah	5,000,000	50,000	200	175,000	235,000	July 1903	1.00
Arizona, c.	Ariz.	3,775,000			1,003,128	4,448,596	Aug. 1903	
Atlantic, c.	Mich.	1,000,000	40,000	25		940,000	Feb. 1901	2.00
Bald Butte, g. s.	Mont.	250,000	200,000	1	15,000	1,312,148	Jad. 1903	.06
Boston & Colo. Sm.	Colo.	750,000	15,000	50		402,350	Oct. 1902	.75
Boston Gold-Copper Sm.	Colo.	1,000,000	1,000,000	1		150,000	Nov. 1901	5.02½
Boston & Mont. Con., c. s. g.	Mont.	3,750,000	150,000	25	600,000	27,725,000	Apr. 1903	2.00
Breece, l. s.	Colo.	5,000,000	200,000	25	10,000	200,000	June 1903	.05
Bunker Hill & Sullivan.	Idaho	3,000,000	300,000	10	72,000	1,514,000	Aug. 1903	.03
Butte & Boston, c.	Mont.	2,000,000	200,000	10		1,600,000	Nov. 1901	3.00
Butterfly-Terrible, g.	Colo.	1,500,000	1,250,000	1		31,250	Oct. 1901	.00½
C. K. & N., g.	Colo.	1,500,000	1,431,900	1	57,276	71,595	July 1903	.01
Calumet & Hecla, c.	Mich.	2,500,000	100,000	25	2,500,000	82,351,000	Sept. 1903	10.00
Camp Bird, g.	Colo.	5,500,000	820,000	5	695,566	826,104	Sept. 1903	.18
Carisa, g. s. c.	Utah	500,000	500,000	1		30,000	Nov. 1903	.03
Centennial Eureka, g. s. l. c.	Utah	5,000,000	100,000	25		2,697,700	Jan. 1902	.50
Center Creek, l. z.	Mo.	1,000,000	100,000	10	10,000	110,000	July 1903	.10
Central Eureka, g.	Cal.	4,000,000	398,525	10	63,744	87,462	Aug. 1903	.02
Central, l.	Mo.	1,000,000	10,000	200	40,000	365,000	Aug. 1903	.50
Champion, c.	Mich.	2,500,000	100,000	28	100,000	100,000	May 1903	1.00
Chippewa Con., g. s. l.	Colo.	150,000	150,000	1		2,500	Dec. 1902	.02½
Con. Mercur, g.	Utah	5,000,000	1,000,050	5	150,000	1,000,000	May 1903	.03
Continental, z.	Mo.	550,000	22,000	25	26,400	44,000	July 1903	.40
Cripple Creek, g. pf.	Colo.	125,000	125,000	1		45,000	Jan. 1902	.40
Cresus, g.	Cal.	1,000,000	200,000	5		227,300	Aug. 1891	.05
Dolton & Lark, g. s. l.	Utah	2,500,000	2,500,000	1		350,000	July 1901	10½
Daly West.	Utah	3,000,000	180,000	20	864,000	3,123,000	Aug. 1903	.60
De Lamar, g. s.	Idaho	400,000	67,180	5		2,708,094	Oct. 1902	.48
Doctor-Jack Pot Con., g.	Colo.	3,000,000	2,900,000	1		232,000	Aug. 1901	.01
Doe Run, l.	Mo.	1,500,000	15,000	100	67,500	604,572	July 1902	1.50
Ducktown, c. i. sul. (Ord).	Tenn.	374,000	74,800	5		165,250	Dec. 1901	.25
Ducktown (Fndr).	Tenn.	1,000	200	5		75,250	May 1901	75.00
Elkton Con., g.	Colo.	3,000,000	2,500,000	1		1,401,461	Mar. 1902	.04
El Paso, g.	Colo	900,000	810,250	1	4,051	14,846	Aug. 1903	.00
Empire State-Idaho, l. s.	Idaho	6,000,000	505,542	10	202,216	1,763,878	Aug. 1903	.65½
Free Coinage, g.	Colo.	1,000,000	10,000	100		160,000	Dec. 1902	10.20
Gemini.	Utah	500,000	5,000	100	100,000	950,000	June 1903	.00
Gold Coin of Victor, g.	Colo.	1,000,000	1,000,000	1	10,000	1,230,000	Jan. 1903	.01
Gold King, g.	Colo.	1,000,000	936,850	1	46,842	459,056	July 1903	.03
Golden Argus, g.	Cal.	800,000	8,000	100		2,000	Dec. 1902	.25
Golden Cycle, g.	Colo.	2,000,000	1,500,000	1	247,500	303,750	July 1903	.05
Golden Eagle, g.	Colo.	500,000	489,015	1		98,916	Sept. 1901	.01
Good Hope, g, s.	Colo.	50,000	500	100	12,500	12,500	Jan. 1903	.25
Grand Central, g.	Utah	250,000	250,000	1	125,000	757,250	July 1903	.10
Gwin, g.	Cal.	1,000,000	100,000	10		426,500	Dec. 1902	.15
Hecla, s. l.	Idaho	250,000	1,000,000	¼	20,000	120,000	June 1902	.02
Hecla Con., s. l.	Mont.	1,500,000	30,000	50		2,930,550	Apr. 1903	.25
Homestake, g.	S. D.	21,840,000	218,400	100	437,100	12,148,950	Aug. 1903	.25
Horn Silver, g. s. c. z. l.	Utah	10,400,000	400,000	25		5,342,000	Dec. 1901	.10
Independence Con., g.	Colo.	2,500,000	2,500,000	1		281,375	Apr. 1901	.04
Ingham Con., g.	Colo.	750,000	1,359,600	½		33,981	Aug. 1901	4.00¼
International Nickel, pf.	U. S.	12,000,000	87,415	100	349,660	349,660	May 1903	.00
Iowa, g. s. l.	Colo.	1,666,667	1,666,667	1	50,001	320,170	July 1903	.01
Iron Silver.	Colo.	10,000,000	500,000	20	150,000	2,800,000	Aug. 1903	.10
Isabella, g.	Colo.	2,250,000	1,250,000	1		742,500	Mar. 1901	.01
Jamison, g.	Cal.	3,900,000	390,000	10	11,700	74,100	Jan. 1903	.03
Kendall, g.	Mont.	2,500,000	500,000	5	80,000	155,000	Aug. 1903	.04
Kennedy, g.	Cal.	10,000,000	100,000	100		1,801,001	June 1900	.05
La Fortuna, g.	Ariz.	250,000	250,000	1		1,082,500	Oct. 1902	.05
Last Dollar, g.	Colo.	1,500,000	1,500,000	1	30,000	210,000	Mar. 1903	.02
Liberty Bell, g.	Colo.	700,000	130,649	1	58,656	71,681	July 1903	.15
Lightner, g.	Cal.	125,000	102,255	1	15,339	48,669	May 1903	.10
Mammoth, g. s. c.	Utah	10,000,000	400,000	25		1,860,000	July 1901	.05
Mary McKinney, g.	Colo.	1,000,000	1,000,000	1	90,000	560,560	July 1903	.03
May Day, g.	Utah	100,000	400,000	¼		30,000	Mar. 1902	.01
Midget, g.	Colo.	1,000,000	1,000,000	1		195,000	Apr. 1902	.15
Mines Co. of America, Finc'l.	U. S.	2,000,000	2,000,000	1	200,000	230,000	Aug. 1903	.01½
Modoc, g. s.	Colo.	500,000	500,000	1	5,000	255,000	Jan. 1903	2.01
Mont. Ore Purchasing.	Mont.	2,500,000	81,000	25	324,000	2,970,000	June 1903	.00
Mountain, c.	Cal.	6,250,000	250,000	25	142,500	3,776,250	May 1903	.57
Mine La Mott, l.	Mo.	3,300,000	300,000	10	120,000	120,000	Apr. 1903	.20
Napa Con., q.	Cal.	700,000	100,000	7		1,180,000	Oct. 1902	1.10
National Lead, com.	U. S.	15,000,000	159,054	100		1,341,486	Mar. 1900	1.00
National Lead, pf.	U. S.	15,000,000	149,040	100	782,460	13,709,348	Sept. 1903	.05
New Idra, q.	Cal.	5,000,000	100,000	5	60,000	460,000	Apr. 1903	.30
New Jersey, z.	U. S.	10,000,000	100,000	100	900,000	5,700,000	Aug. 1903	3.00
New Leadville Home, g.	Colo.	2,000,000	2,000,000	1		285,500	Feb. 1902	00.5
Nugget, g.	Colo.	1,000,000	991,000	1		84,730	July 1901	.01
Ontaria, s. l.	Utah	15,000,000	150,000	100		14,917,000	Dec. 1902	.02
Osceola, c.	Mich.	2,500,000	596,150	25		4,247,300	Dec. 1901	3.00
Parrot, c.	Mont.	2,300,000	229,850	10		5,772,925	Jan. 1902	.50
Pennsylvania, Con, g.	Cal.	5,150,000	51,500	100	5,150	171,625	Aug. 1903	.10
Pioneer, g.	Alaska.	5,000,000	50,000	100		300,000	Dec. 1902	6.00
Portland, g.	Colo.	3,000,000	3,000,000	1	270,000	4,567,080	July 1903	.03
Pride of the West.	Ariz.	1,500,000	150,000	10		15,000	Oct. 1902	.10½
Quicksilver, pf.	Cal.	4,300,000	43,000	100	21,500	1,931,411	May 1903	.50
Quincy, c.	Mich.	2,500,000	100,000	25	550,000	14,120,000	Aug 1903	3.00
Rob Roy, z.	Mo	15,000	13,825	1	1,205	1,757	July 1903	.02
Rocco-Homestake-Nevada, l. s.	Nev.	300,000	240,000	1		90,000	Nov. 1902	.91
Sacramento, g.	Utah	5,000,000	1,000,000	5	35,000	168,000	July 1903	.00½
St. Joseph, l.	Mo	6,000,000	375,000	10	112,500	3,722,000	June 1903	.15
Silver Hill, g. s.	Nev.	180,000	180,000	1	9,000	19,800	Mar. 1903	.05
Silver King, g. s. l.	Utah	3,000,000	150,000	20	800,000	6,850,000	Aug. 1903	.66⅔
Smuggler, s. l. z.	Colo.	1,000,000	1,000,000	5		2,175,000	Feb. 1902	.01
Spearfish, g. pf.	So. Dak	1,000,888	882,000	1	52,920	70,560	Aug. 1903	.01
Specie Payment, 6.	Colo.	1,000,000	1,000,000	1		40,190	Oct. 1902	.00
Standard Con., g. s.	Cal.	2,000,000	178,394	10	35,678	4,142,492	May 1903	.10
Standard, c.	Ariz.	500,000	400,000	1	20,000	20,000	June 1903	.15
Standard, s. l.	Idaho	500,000	500,000	1	200,000	2,920,000	Aug. 1903	.05
Stratton's Independence, g.	Colo.	5,500,000	1,000,007	5	265,002	3,930,273	Aug. 1902	.25
Swansea, s. l.	Utah	500,000	100,000	5		330,500	June 1902	.05
Syndicate, g.	Cal.	100,000	100,000	1		82,000	Aug. 1902	.52
Tamarack, c.	Mich.	1,500,000	60,000	25		8,490,000	Dec. 1901	10.00
Tomboy, g. s.	Colo.	1,500,000	300,000	5		1,244,000	July. 1902	.24
Town Topics, g. s.	Colo.	1,000,000	1,000,000		10,000	45,000	June 1903	.00½
Trimountain, c.	Mich.	2,500,000	100,000	25	300,000	300,000	June 1903	1.50
Trinity County, g.	Cal.	1,000,000	100,000	10	40,000	540,000	Aug. 1903	.05
United, (Creede) g.	Colo.	500,000	500,000	1	10,000	45,000	May. 1903	.02
Union, g.	Colo.	1,250,000	1,250,000	1		445,244	Jan. 1902	.02
United, c. pf.	Mont.	5,000,000	50,000	100	150,000	300,000	May. 1903	.300
United, g.	Colo.	5,000,000	3,994,769	51	40,091	319,933	Jan. 1903	.01
United, z. l., com.	Mo	5,000,000	78,900	7	7,764	22,961	Apr. 1903	.05
United, z. l. pf.	Mo	1,000,000	18,398	25	17,040	99,095	Apr. 1903	.50
United Verde, c.	Ariz.	3,000,000	300,000	10	1,125,000	14,160,322	Aug. 1903	.75
U. S. Red. & Ref., com.	Colo.	6,000,000	59,188	100	236,752	413,978	Sept. 1903	1.00
U. S. Red. & Ref., pf.	Colo.	4,000,000	39,458	100	236,748	472,821	Sept. 1903	1.50
Utah, g.	Utah	1,000,000	100,000	10	10,000	217,000	May. 1903	.02
Utah Con., c.	Utah	1,500,000	300,000	5	954,000	1,686,000	July. 1903	1.50
Vindicator Con., g.	Colo.	1,500,000	1,100,000	1	165,000	1,082,000	July. 1903	.05
Waldorf, g.	Colo.	3,000,000	3,000,000	1	7,500	32,000	July. 1903	.00½
Wasp No. 2, g.	So. Dak	500,000	147,900	1		218,410	June 1902	.00½
White Rock, g.	Nev.	500,000	200,000	2½		2,000	Aug. 1903	.01
Wolverine, c.	Mich.	1,500,000	60,000	25	330,000	1,230,000	Oct. 1903	3.00
Yankee Con., g. s. l.	Utah	500,000	500,000	1		75,000	Apr. 1902	.05
Yellow Aster, g	Cal.	1,000,000	105,000	10	60,000	533,789	June 1903	.20

COAL, IRON AND INDUSTRIALS

Name and Location of Company.		Authorized Capital Stock.	Shares. Issued.	Par Val	Dividends Paid 1903.	Total to Date.	Latest. Date.	Amt.
Ala. Con., Coal & Iron, pfd.	Ala.	$2,500,000	$24,938	$100	$86,234	$803,445	June 1903	$1.75
Ala. & Ga. Iron, pfd.		650,000	6,500	100	6,500	6,500	Jan. 1903	1.00
Allis-Chalmers, pfd.	U. S.	25,000,000	200,000	100	853,125	2,343,750	Aug. 1903	1.75
Alma Oil.	Cal.	400,000	380,000	1	22,800	22,800	June 1903	.03
Altoona Coal & Coke Co.	Pa.	2,500,000	250,000	10	544,050	4,126,710	Jan. 1901	.30
Amer. Agr. Chem., pfd.	U. S.	20,000,000	181,350	100	544,050	4,126,710	Apr. 1903	3.00
American Cement.	Pa.	2,100,000	200,000	10	240,000	620,000	July. 1903	.40
American Coal.	Md.	1,500,000	50,000	25	150,000	1,432,500	Sept. 1903	1.25
Aztec Oil.	Cal.	250,000	235,000	1	9,400	25,850	May. 1903	.03
Cambria Steel.	Pa.	50,000,000	900,000	50	1,350,000	6,450,000	Aug. 1903	.75
Central Coal & Coke, com.	Mo.	5,125,000	51,250	100	230,625	474,375	July. 1903	1.50
Central Coal & Coke, pfd.	Mo.	1,875,000	18,750	100	70,311	773,435	July. 1903	1.25
Central Oil.	W. Va.	1,500,000	60,000	25	15,000	137,500	May. 1903	.25
Central Oil.	Cal.	1,000,000	800,000	1		100,147	Jan. 1902	.03
Colorado Fuel & Iron, com.	Colo.	38,000,000	230,310	100		1,642,500	Apr. 1902	1.75
Colorado Fuel & Iron, pfd.	Colo.	2,300,000	20,000	100	80,000	1,560,000	Feb. 1903	4.00
Columbus & Hocking C. & I.	Ohio.	7,000,000	69,244	100	34,610	69,220	Mar 1903	.50
Consolidation Coal.	Md.	10,250,000	102,500	100	205,000	6,536,650	Jan. 1903	2.00
Consolidated Coal.	Ill.	5,000,000	50,000	100		100,000	Jan. 1902	1.00
Crucible Steel, pfd.	U. S.	25,000,000	250,000	100	875,000	4,812,500	June 1903	1.75
Cummings Cement.	N. Y.	300,000	3,000	100		189,000	July 1902	9.00
Dixon, Joseph, Crucible.	N. J.	1,000,000	7,345	100	14,690		July. 1903	1.00
Empire Steel & Iron, pfd.	U. S.	5,000,000	23,700	100	35,550	355,442	Jan. 1903	1.50
Four Oil.	Cal.	300,000	208,700	1	14,609	41,740	Aug. 1903	.01
General Chem., com.	U. S.	12,500,000	74,103	100	277,887	1,207,908	Sept. 1903	1.25
General Chem., pfd.	U. S.	12,500,000	100,000	100	441,240	2,416,418	July. 1903	1.50
George's Creek Coal and Iron.	Md.	2,500,000	22,000	100	33,000		Jan. 1903	3.00
Giant Oil.	Cal.	500,000	500,000	1	5,000	5,000	Jan. 1903	.01
Hanford Oil.	Cal.	20,000	2,000	10		13,000	Sept. 1902	1 50
Heywood Oil.	Tex.	800,000	800,000	1	16,000	144,000	Jan. 1903	02
Higgins Oil.	Tex.	2,500,000	17,609	100		96,850	Apr. 1902	1 50
Home Oil.	Cal.	100,000	100,000	1	42,500	492,500	June 1903	05
Homestake Oil.	Cal.	100,000	10,000	10		33,000	Aug. 1902	15
Houston Oil, pfd.	Tex.	7,500,000	75,000	100	224,125	896,500	Feb. 1903	3 00
Imperial Oil.	Cal.	1,000,000	100,000	100	160,000	420,000	Aug. 1903	20
Int'l Acheson Graphite, pfd.	N. Y.	500,000	5,000	100	17,500	87,500	Feb. 1903	5.50
Jeff. & Clearf., Coal & Iron, com.	Pa.	1,500,000	15,000	100	75,000	180,000	Aug. 1903	5 00
Jeff. & Clearf., Coal & Iron, pfd.	Pa.	1,500,000	15,000	100	75,000	540,500	Aug. 1903	2 50
Lehigh Coal & Nav.	Pa.	14,346,650	286,933	50	286,933	20,382,043	May. 1903	1.00
Maryland Coal, pfd.	Md.	2,000,000	18,850	100	65,975	951,885	July. 1903	3 50
Monongahela R. Coal, pfd.	Pa.	10,000,000	97,300	5	347.165	2,777,080	Jan. 1903	3.50
Monte Cristo Oil.	Cal.	500,000	500,000	1	20,000	20,000	May. 1903	.01
National Carbon, pf.	U. S.	4,500,000	45,000	100	236,250	1,506,250	Aug. 1903	1 75
Ohio & Indiana Natural Gas.	U. S.	10,000,000	800,000	100	180,000	1,260,000	June 1903	1.00
Pacific Coast Borax.	Cal.	2,000,000	18,000	100	152,000	1,469,500	Aug. 1903	1.00
Peerless Oil.	Cal.	1,000,000	92,000	10	92,000	139,280	Aug. 1903	14
Pennsylvania Salt Mfg.	Pa.	5,000,000	100,000	50	150,000	13,330,300	Apr. 1903	3.00
Penna. Steel of N. J.	Pa.	25,000,000	168,211	100	588,750	2,917,000	Mar. 1902	3.50
Philadelphia Gas, com.	Pa.	16,102,131	308,542	50	649,218	3,185,425	Aug. 1903	.75
Philadelphia Gas, pfd.	Pa.	3,998,350	212,873	50	199,918	1,009,057	Sept. 1903	1.25
Pittsburg Coal, pfd.	Pa.	32,000,000	297,012	100	1,559,313	7,796,565	July. 1903	1.75
Pittsburg Oil.	Cal.	300,000	220,000	1	30,000	30,000	Aug. 1903	.02½
Rep. Iron & Steel, pfd.	U. S.	25,000,000	204,169	100	1,070,837	5,685,131	July. 1903	1.75
Retsof Salt.	N. Y.	5,000,000	36,000	100	72,000	648,000	Apr. 1903	1.00
San Joaquin Oil.	Cal.	100,000	100,000.	1	25,000	185,000	Aug. 1903	.05
Shelby Iron.	Ala.	1,000,000	10,000	100	10,000	700,000	May. 1903	10.00
Sloss-Sheffield Steel & Iron, pfd.	Ala.	20,000,000	65,085	100	342,000	1,596,000	July. 1903	1.75
St. Bernard Coal & Coke.	Ky-Ten.	1,000,000	10,000	100		770,000	Dec. 1902	6.00
Standard Oil (of N. J.).	U. S.	100,000,000	970,000	100	31,040,000	195075,000	Sept. 1903	5.00
Susquehanna I. & S., pfd.	Pa.	1,500,000	300,000	5	45,000	717,000	Jan. 1903	15
Temple Iron.	Pa.	240,000	2,400	100	14,400	21,500	July 1903	3.00
Tenn. C. I. & R. R., com.	Tenn.	23,000,000	225,531	100		1,102,600	Nov. 1900	2.00
Tenn. C. I. & R. R., pfd.	Tenn.	248,000	2,480	100	14,880	302,144	Aug. 1903	2.00
Tex. & Pacific Coal.	Tex.	2,000,000	20,000	100	90,000	2,130,065	July. 1903	1.50
Thirty-three Oil.	Cal.	500,000	100,000	5	80,000	200,000	Aug. 1903	10
Thomas Iron.	Pa.	2,500,000	25,000	200		200,000	Aug. 1902	4 00
Tidewater Steel, pfd.	Pa.	600,000	60,000	1	18,000	18,000	Jan. 1904	.30
Union Oil.	Cal.	10,000,000	52,672	100	36,870	334,000	Jan. 1903	.70
U. S. Steel Corp., com.	U. S.	550,000,000	5,084,952	100	15,249,075	50,809,495	Sept. 1903	1 00
U. S. Steel Corp., pfd.	U. S.	550,000,000	5,103,141	100	26,789,757	89,262,577	Aug. 1903	1.75
Va.-Carolina Chem., Com.	U. S.	38,000,000	279,844	100	699,611	3,678,829	June 1903	1 25
Va.-Carolina Chem., pfd.	U. S.	2,000,000	120,000	100	720,000	6,780,839	July 1903	2.00
Victoria Coal & Coke, com.	W. Va.	150,000	1,500	100		15,000	Jan. 1901	10.00
Victoria Coal and Coke, pfd.	W. Va.	100,000	1,000	100		15,000	July 1902	3.00
Westmoreland Coal.	Pa.	5,000,000	250,000	50	375,000	7,875000	Apr. 1903	1.50
West Shore Oil.	Cal.	100.000	100.000	1	35.000	80,000	July 1903	05

CANADA, CENTRAL AND SOUTH AMERICA, MEXICO.

Name and Location of Company.		Authorized Capital Stock.	Shares. Issued.	Par val	Dividends Paid 1903.	Total to Date.	Latest. Date.	Amt.
Amistad y Concordia.	Mex.	$480,000	9,000	$50	$75,888	$154,918	July. 1903	$3.68
Barreno.	Mex.		2,400		14,404	67,954	Aug. 1903	.85
Bartolome de Medina Mill.	Mex.	50,000	2,000	25	11,885	74,348	Aug. 1903	.65
Buena Vista, g. s.	Mex.	100,000	1,000	199	5,000	5.000	June 1903	5.00
Butters' Salvador.	Salv.	750,000	150,000	5	144,000	144,000	Aug. 1903	.72
Cariboo McKinney.	B. C.	1,250,000	1,250,000	1		496,837	Mar. 1902	.01½
Carmen.	Mex.	27,500	1,100	25	2,508	72,083	July. 1903	2.28
Center Star, g.	B. C.	3,500,000	3,500,000	1		210,000	May. 1901	.01
Cinco Senores.	Mex.		2,000		55,870	711 935	July. 1903	4.10
Copiapo, c.	Chile.	1,125,000	112,500	10	39,900	2,865,900	Feb. 1903	.36
Dolores, g. s.	Mex.	100,000	100,000	1	25,000	25,000	Jan. 1905	.25
Dominion Iron & Steel, pf.	N. S.	5,000,000	50,000	100	175,000	700,000	Apr. 1903	3.50
Dominion Coal, pf.	N. S.	3,000,000	30,000	100	180,000	2,340,000	July. 1903	2.00
Dos Estrellas.	Mex.	150,000	3,000	50	221,400	446,400	Aug. 1903	12.75
El Oro, g. s.	Mex.	5,000,000	1,000,000	5	36,000	1,922,100	July. 1903	.36
Esperanza, s. g.	Mex.	150,000	3,000	50	70,920	1,140,999	July. 1903	4.10
Fraternal, s.	Mex.	5,000	1,000	5	10,675	40,175	July. 1903	2.08
Goodenough, s. l.	B. C.	800,000	653,400	1		13,188	Jan. 1902	.01
Greene Con., c.	Mex.	7,200,000	720,000	10	432,000	652,000	May. 1903	.20
Guadalupana.	Mex.	15,000	3,000	5	6,930	69,930	Mar. 1903	.77
Guadalupe Mill.	Mex.	1,000,000	10,000	100	30,800	1,515,750	Apr. 1903	.77
Le Roi, g.	B. C.	5,000,000	200,000	25		1,305,000	Nov. 1899	1.20
Le Roi No. 2, g.	B. C.	3,000,000	120,000	35		288,000	May. 1902	1.20
Mesquital	Mex.	125,000	250,000	½	15,000	51,458	Feb. 1903	.06
Metalurgical Co, of Torreou.	Mex.	1,500,000	30,000	50	289,500	289,500	Apr. 1903	8.98
Natitivad, s. g.	Mex.	36,000	2,400	15	60,840	224,466	Aug. 1903	4.25
N. Y. & Hond. Rosario, s. g.	C. A.	1,500,000	150,000	10	120,000	1,970,000	Aug. 1903	.10
North Star, s. l.	B. C.	1,500,000	1,300,000	1		581,356	Dec. 1902	.01
Nova Scotia St. & Coal, com.	N. S.	5,000,000	41,200	100	123,600	391,400	Apr. 1903	1.00
Nova Scotia St. & Coal, pfd.	N. S.	2,000,000	10,300	100	61,800	185,400	July. 1903	2.00
Providencia (S. J.).	Mex.	90,000	6,000	15	13,860	174,360	Mar. 1903	.77
Rambler-Cariboo, s. l.	B. C.	1,250,000	1,250,000	1		230,000	Nov. 1902	.01½
Real del Monte.	Mex.		2,554		31,414	2,904,664	July. 1903	4.15
St. John del Rey, g.	Brazil.	3,000,000	546,365	5	87,402	14,093,397	June 1903	.16
Soledad, s. l.	Mex.	180,000	960	20	21,327	243,568	Aug. 1903	2.13
Sorpressa.	Mex.	19,200	960	20	5,892	191,546	Aug. 1903	2.13
Sta. Maria de Guadalupe.	Mex.	2,500	2,500	1		377,918	Sept. 1902	4.08
Sta. Maria de la Paz.	Mex.		2,400		23,040	1,871,313	June 1903	9.60
San Francisco Mill.	Mex.	50,000	6,000	25		284,760	Nov. 1902	.40
Sta. Gertrudis.	Mex.	1,920,000	38,000	50	103,896	2,751,440	Aug. 1903	
San Rafael.	Mex.	60,000	2,400	25	94,940	1,867,988	Aug. 1903	
Union Mill.	Mex.	150,000	3,000	50	17.775	402,245	June 1903	2.15
Ymir, g.	B. C.	1,000,000	200,000	5		288,000	Mar. 1902	.23

NOTE—These dividends are published gratuitously. Readers are invited to send any additions or corrections which they think necessary to complete our list.